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ANTHONY PRIZE PITCHER AND GOBLETS.

FRONT VIEW.

Engraved expressly for the Photographic Art Journal.

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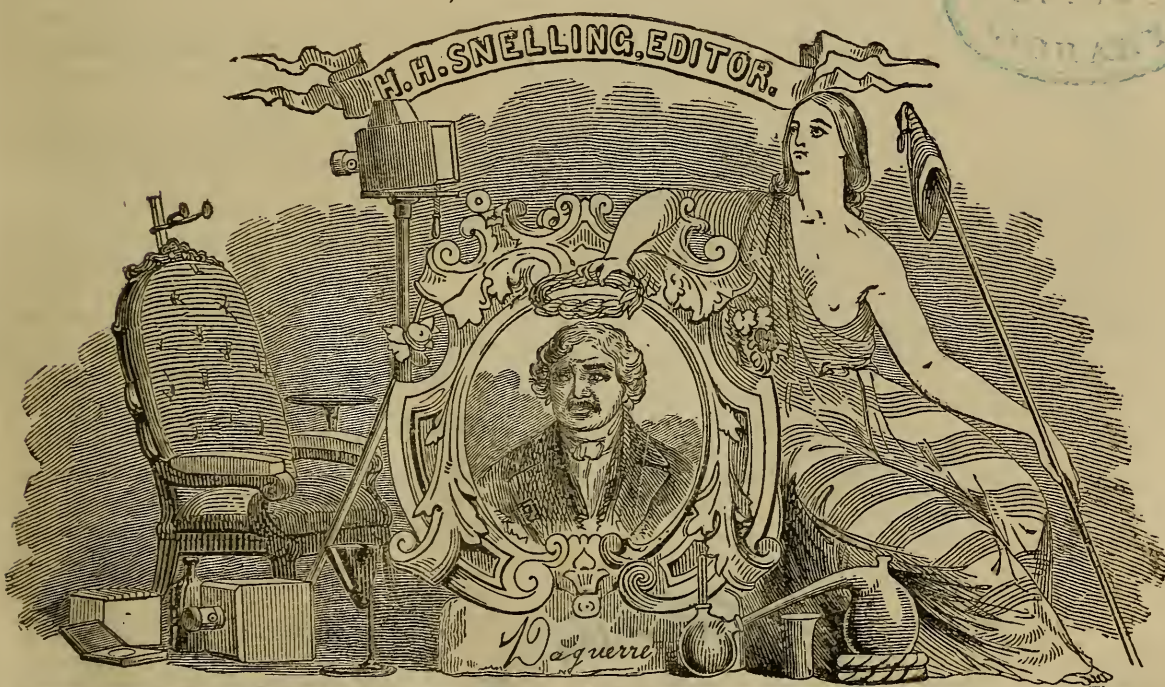


ANTHONY PRIZE PITCHER,
BACK VIEW.
Engraved expressly for the Photographic Art Journal.

THE
PHOTOGRAPHIC
ART
JOURNAL.

VOLUME 4.—1852.

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THE PHOTOGRAPHIC ART-JOURNAL.

Vol. 4.

JULY, 1852.

No. 1.

PHOTOGRAPHY.*

BY ROBERT HUNT.

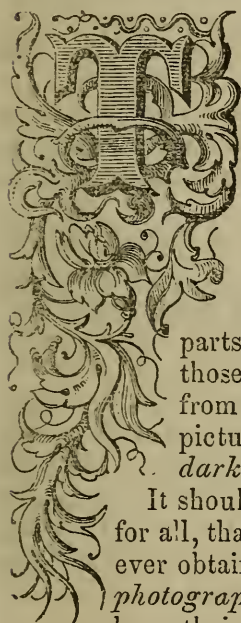
PROFESSOR OF MECHANICAL SCIENCE IN THE MUSEUM OF PRACTICAL GEOLOGY,

AUTHOR OF

"RESEARCHES ON LIGHT," "THE POETRY OF SCIENCE," ETC.

CHAPTER V.

ON THE APPARATUS NECESSARY FOR THE
PRACTICE OF PHOTOGRAPHY ON PAPER.



THE most simple method of obtaining sun-pictures, is that of placing the objects to be copied on a piece of prepared paper, pressing them close by a piece of glass, and exposing the arrangement to sunshine; all the parts exposed darken, while those covered are protected from change, the resulting picture being *white* upon a *dark* ground.

It should be here stated, once for all, that such pictures, howsoever obtained, are called *negative photographs*; and those which have their lights and shadows correct as in nature—dark upon a light ground, are *positive photographs*. The frontispiece to this volume represents such a *negative* image, and the *positive* impression resulting from it. The mode of effecting this is, having, by fixing, given permanence to the negative picture, it is placed, face down, on another piece of sensitive paper, when all the parts which are white on the first, admitting light freely, cause a dark impression to be made on the second, and the resulting image is correct

in its lights and shadows, and also as it regards right and left.

For the multiplication of photographic drawings, it is necessary to be provided with a frame and glass, the most convenient size for which is something larger than a single leaf of quarto post writing paper. The glass must be of such thickness as to resist some considerable pressure, and it should be selected as colorless as possible, great care being taken to avoid such as have a tint of yellow or red, these colors preventing the permeation of the most efficient rays. Figures 8 and 9 represent the frame; the one showing it in front, as in taking a copy of leaves, and the other the back, with its piece of stout tinned iron, which presses on a cushion, securing the close contact of the paper with every part of the object to be copied, and its brass bar, which, when pressed into angular apertures in the sides of the frame, gives the required pressure to the paper.

Having placed the frame face downwards, carefully lay out on the glass the object to be copied, on which place the photographic paper very smoothly. Having covered this with the cushion, which may be either of flannel or velvet, fix the metal back, and adjust it by the bar, until every part of the object and paper are in the closest contact. The frame might, for very particular purposes, be rendered more complete, by having the back adjusted with binding screws; but, for all ordinary uses, the bar answers every purpose.

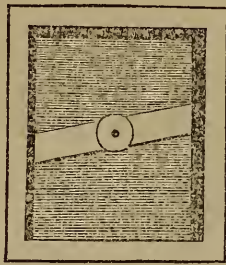
In arranging botanical specimens, the under surface of the leaves should be next

* Continued from Vol. 3, No. 6, page 342.

the glass, their upper and smooth surface in contact with the paper. Although very



8.



9.

beautiful copies may be taken of dried specimens, they bear no comparison with those from fresh-gathered leaves or recently collected plants, of which, with the most delicate gradations of shades, the nerves of the leaves, and the down clothing the stems, are exhibited with incomparable fidelity. In the event of the plant having any thick roots or buds, it will be best to divide them with a sharp knife, for the purpose of equalizing the thickness in all parts, and ensuring close contact.

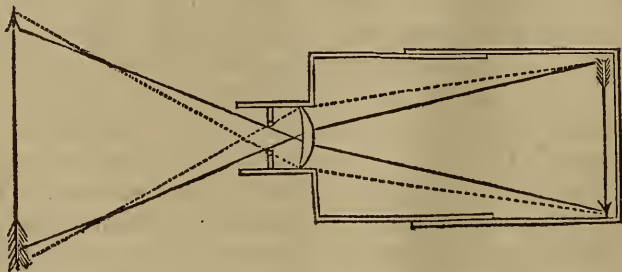
Engravings are to be placed with their faces to the prepared side of the paper, and laid very smoothly on the glass, and then with the cushion and back pressed into the closest contact possible; the least difference in the contact, by permitting dispersion, occasions a cloudiness and want of sharpness in the photograph. Of course, a copy of anything taken by means of the rays which have passed through it, must present all the defects as well as all the beauties of the article, whatever it may be. A photographic copy of an engraving gives us, besides the lines of the engraving, all the imperfections of the paper; this renders it necessary that those engravings should be selected which are on tolerably perfect paper. If the preservation of the

engraving is not a matter of much moment, by washing it over the back with a varnish of Canada balsam and spirits of turpentine, it is rendered highly transparent, and, of course, the resulting impression is much improved. Care must, however, be taken to use the varnish very thin, that it may not impart any yellow tinge to the paper. An exposure of a few minutes only is sufficient to produce strong and faithful copies during sunshine; but in diffused daylight a longer period is necessary.

The copying frame is an indispensable requisite to the photographer; it is used for copying all small objects by transmission, and multiplying the original pictures from Nature. It is, indeed, the printing press of the artist. Some prefer two plates of stout plate glass pressed very closely together with clamps and screws; but, as the intention is to bring the object to be copied and the sensitive paper into the closest possible contact, numerous mechanical contrivances will suggest themselves for this purpose.

With the copying-frame a great number of experiments should be made before there is any attempt at using the camera-obscura.

The camera-obscura, or darkened chamber, was the invention of Baptista Porta, of Padua. Its principle will be best understood by the very simple experiment of darkening a room by closing the window-shutters and boring a small hole in them. If a piece of paper is held at a little distance from this hole, the figures of external objects will be seen delineated upon it; and, by putting a small lens over the hole, they are rendered much more evident, from the condensation of the rays by the spherical glass.



10

If, instead of a darkened room, we substitute a darkened box (Fig. 10) the same

effect will be seen to result. Suppose, in the first place, the box to be within the

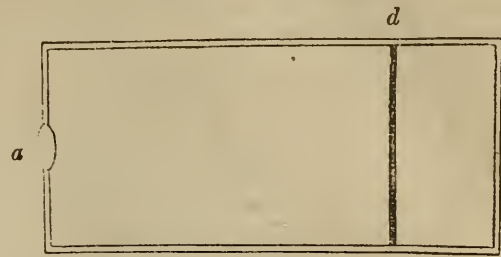
lens, the rays would pass from the external arrow in nearly right lines through the opening, and form an image corresponding in size on the back of the dark box. The lens, as shown, refracts the rays, and a smaller but a more perfectly defined image is the result.

As in the phenomena of vision, so in the camera-obscura, the image is produced by the radiations proceeding from the external object; and as these radiations progress from various parts, more or less illuminated, so are the high lights, the middle tints and shadows, most beautifully preserved in the spectral image. The colors, also, being in the first instance the effect of some physical modification of the primary cause, are repeated under the same influence; and the definition, the color, and soft gradation of light and shadow, are so perfect, that few more beautiful optical effects can be produced than those of the camera-obscura.

Now as every ray of light producing the colored image is accompanied by the chemical principle *actinism*, and as this is regulated in action by the luminous intensity of the rays, the most luminous (*yellow*) producing the least chemical effect, which increases with the diminishing illuminating power of the radiating source, we have the impression made of every gradation according to the color of the object we would copy.

For the practice of photography with such success as approaches the perfection of the art, an instrument of the utmost refinement is necessary; but the learner may content himself with a very simple and inexpensive form of apparatus. Many of my earliest, and these were by no means my worst experiments, were made with a camera constructed from a cigar-box; a hole being pierced in one end of it, and fitted with a lens, the photographic paper being pinned upon a stiff piece of cardboard the size of the box, and placed in the focus of the lens. It is necessary that the box be painted on the inside with a mixture of lamp-black and stiff size, to prevent the reflection of the dispersed light. Fig. 11 gives this arrangement; *a* being the lens through which the image falls upon the paper fixed on the moveable board at *d*, this being necessarily moveable, since, according to the distance of the object from

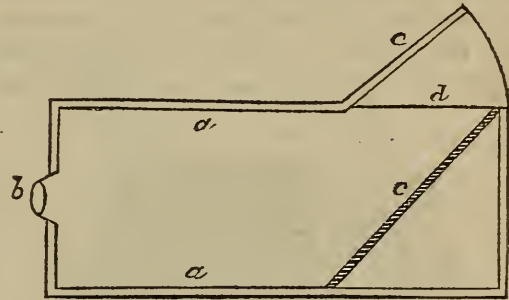
a, so will be the focal distance from the lens producing the best image.



11.

In the ordinary cameras used by artists for sketching, a mirror is introduced which throws the image on a semi-transparent table.

Fig. 12 is a section of one form of such an instrument: *a a* represents the box, in one end of which is fixed the lens *b*. The

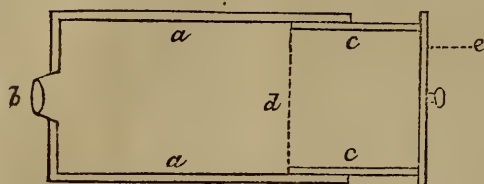


12.

lenticular image falls on the mirror *c*, placed at such an angle that it is reflected on the plane of ground glass *d*. *e* is a screen to prevent the overpowering influence of daylight, which would render the picture almost invisible. This form of the apparatus, though very interesting as a philosophical toy, and extremely useful to the artist, is by no means fitted for photographic purposes. The radiations from external objects suffer considerable diminution of chemical power in penetrating the lens, and the reflection from the mirror so far reduces its intensity, that its action on photographic agents is slow. To obviate the objection of the reflected image it is only necessary to place the photographic paper in the place of the mirror, but not in an angular position.

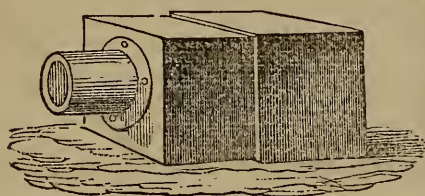
Fig. 13 represents the photographic camera of a common, convenient, and very economical form. *a a* is the outer box, in which is fixed the lens *b*, and *c* another box sliding within it, at the inner end of which is placed the prepared paper *d*: by

sliding this box forth and back, we are enabled to adjust the paper to the correct focus of the lens, the image being observed through a small hole at *e*.



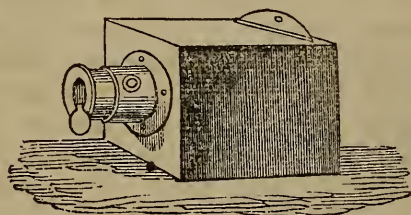
13.

A great variety of these instruments have been introduced to the notice of students of the art, many of them so unnecessarily expensive that they are beyond the reach of the humble amateur. It is conceived that a few examples of mechanical contrivances by which the instrument is rendered portable, and in all respects convenient, will not be out of place in this treatise. Figure 14 represents one box sliding within



14

the other for the purpose of adjusting the focus, the lens being fitted into a brass tube which screws into the front of the camera. The wood-cut (Fig. 15) is but one box,



15.

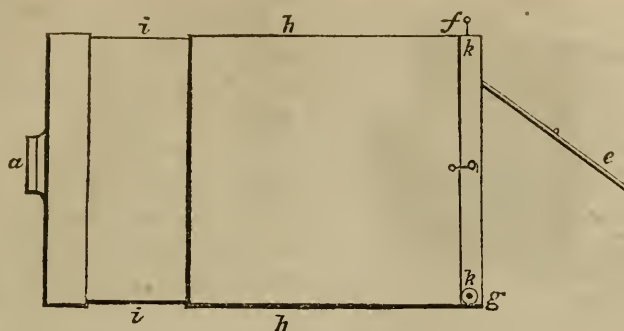
the lens being fitted into one brass tube sliding in another, like a telescope tube, the moveable part being adjusted by a screw and rack. The mouth of the tube is contracted, by which any adventitious radiations are obstructed, and a brass shade is adjusted to close the opening if required; the paper is placed in a case fitted with a glass front, as in Fig. 16, and a shutter, by which it is protected from the light until the moment it is required to throw the image upon it.



16.

In the former edition of this work, a form of camera was described, which possesses many advantages; and even after years' practice with various instruments, few have been altogether more successful. It is, therefore, here described in the language I employed in 1841:—

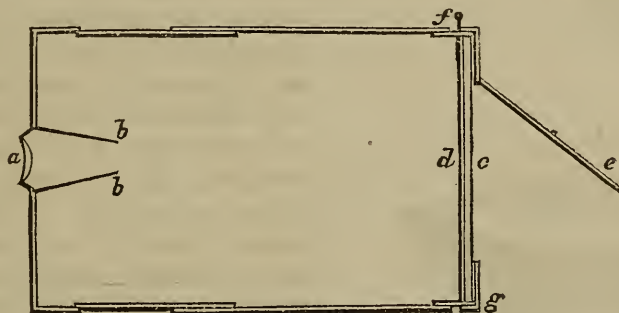
A photographic camera should possess, according to Sir John Herschel, "*the three qualities of a flat field, a sharp focus at great inclinations of the visual ray, and a perfect achromaticity.*" There can be no doubt but these qualifications are very essential,—the two first particularly are indispensable, and there is but one objection to the latter. We can only produce perfect achromaticity by a combination of glasses, and experiments prove that by increasing the thickness of the object-glass, and the number of reflecting and refracting surfaces, we interrupt a considerable portion of light, and consequently weaken the action on the photographic material, whatever it may be; but our opticians have succeeded to a great extent in overcoming this difficulty. We may to a considerable extent, get rid of the defects arising from chromatic dispersion, without having recourse to a combination of glasses of different refracting powers. I have long used myself, and constructed for others, a camera-obscura, which appears to answer remarkably well, with a non-achromatic lens. It is but right I should acknowledge that I am indebted to the suggestions of Dr. Wollaston for part of my lenticular arrangement. (Fig. 17) *a* represents the aperture of the lens; *i i*, a box sliding into an outer case, *h h*; *k k*, a third division, containing a ground glass at the back, and a door which can be raised or lowered by the screw *g*, the whole fitting into the frame *h h*.



17.

Figure 18 is a section of the camera. *a* is a lens of a perioscopic form, whose radii of curvature are in the proportion of 2 to 1. This meniscus is placed with its

convex surface towards the plane of representation, and with its concavity towards the object.

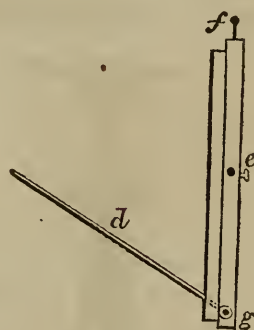


18.

The aperture of the lens itself is made large, but the pencil of rays admitted is limited by a diaphragm, or stop, constructed as in the figure at *b*, between it and the plane of representation, at about one-tenth of the focal length from the lens. By this arrangement objects are represented with considerable distinctness over every part of the field, but little difference being observable between the edges and the centre. *c* is the plate of ground glass at the back, which serves to adjust the focus by, and also to lay the photographic paper on, when we desire to copy any object; *d*, a door to shut off the light from the paper or plate until the moment we desire to expose it to luminous agency. Figure 19 represents this screen or door more perfectly, in the act of falling; *e*, is a door at the back, through which the picture formed on the opaque glass is examined; *f*, a pin, keeping the door, *d*, in its place.

The following figures (Figs. 20, 21, 22)

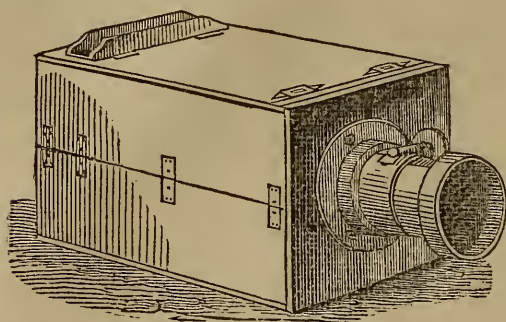
represent a more perfect arrangement, and, at the same time, one which is not essen-



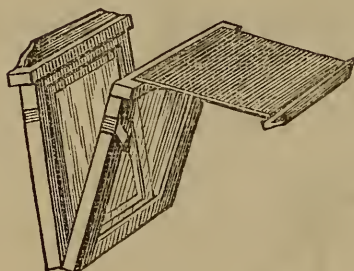
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tially expensive. Its conveniences are those of folding, and thus packing into a very small compass, for the convenience of travelers.

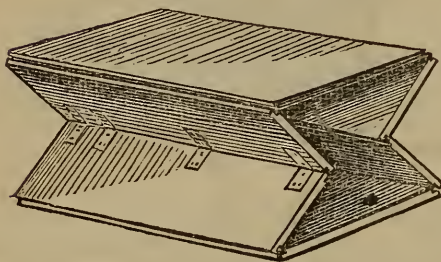
With the camera-obscura properly arranged, and the copying frame, the photographic student who confines his attention to the processes on paper has nearly all he



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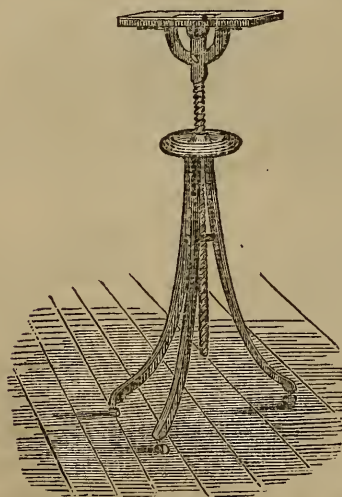


21.



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requires. For the convenience of adjusting the instrument to different heights, and



23.

to different angles of elevation, tripod stands are convenient, but not altogether

indispensable. [They are made in several ways; but that represented by Fig. 23, invented by Mr. Davie of Utica, and those made by Mr. W. A. Allen, of New York, are decidedly the best styles in use.—*Ed. Phot. Art-Jour.*]

Beyond these things, a few dishes, and a frame upon which a photograph can be placed for the purpose of being washed, are the only things required for the practice of this branch of photography.

CHAPTER VI.

ON FIXING THE PHOTOGRAPHIC PICTURES.

The power of destroying the susceptibility of a photographic agent to the further action of light, when the picture is completed by its influence, is absolutely necessary for the perfection of the art. Various plans have been suggested for accomplishing this, which have been attended with very different results; few, if any, of the materials used producing the required effect, and, at the same time, leaving the picture unimpaired. The hyposulphite of soda is decidedly superior to every other fixing material; but it will be interesting to name a few other preparations, which may be used with advantage in some instances.

The pictures formed on papers prepared with the nitrate of silver only, may be rendered permanent by washing them in very pure water. The water must be quite free from any muriates, as these salts attack the picture with considerable energy, and soon destroy it, by converting the darkened silver into a chloride, which changes upon exposure.

The great point to be aimed at in fixing any of the sun-pictures is the removal of all that portion of the preparation, whatever it may be, which has not undergone change, without disturbing those parts which have been altered in the slightest degree by the chemical radiations. When a picture has been obtained upon paper prepared with the nitrate of silver, or the ammonio-nitrate of silver, the best mode of proceeding is to wash it first with warm rain water, and then with a diluted solution of ammonia; if the ammonia is too strong, it dissolves the oxide of silver, which in these processes is formed in the

fainter parts of the picture, and thus obliterates the more delicate portions. Herschel remarks—"If the paper be prepared with the simple nitrate, the water must be distilled, since the smallest quantity of any muriatic salt present attacks the picture impressed on such paper with singular energy, and speedily obliterates it, unless very dark. A solution containing only a thousandth part of its weight of common salt suffices to effect this in a few minutes in a picture of considerable strength."

Photographs on the muriated papers are not, however, so easily fixed. Well soaking these in water dissolves out the excess of nitrate of silver, and thus the sensibility is somewhat diminished; indeed they may be considered as half fixed, and may in this state be kept for any convenient opportunity of completing the operation.

Muriate of soda (common salt) was recommended by Mr. Talbot as a fixing material, but it seldom is perfectly successful; as a cheap and easy method, it may be occasionally adopted, when the picture to be preserved is not of any particular consequence.

It may appear strange to many that the same material which is used to give sensitiveness to the paper should be applied to destroy it. This may be easily explained: in the first instance, it assists in the formation of the chloride of silver; in the other, it dissolves out a large portion of that salt from the paper, the chloride being soluble in a strong solution of muriate of soda. When common salt is used, the solution of it should be tolerably strong. The picture being first washed in water, is to be placed in the brine, and allowed to remain in it for some little time; then, being taken out, it is to be well washed in water, and slowly dried. If the brine is used in the saturated state, the white parts of the photograph are changed to a pale blue—a tint which is not, in some cases, at all unpleasant.

I have in my possession some pictures which have been prepared more than eight years, which were then fixed with a strong brine, and subsequently washed with warm water. They have become slightly blue in the white portions, but otherwise they are very permanent; and they have lost but little of their original character.

The chloride of silver being soluble in

solution of ammonia and some of its salts, they have been recommended for fixing photographs. The ammonia, however, attacks the oxide, which forms the darkened parts, so rapidly, that there is great risk of its destroying the picture, or, at least, of impairing it considerably. It matters not whether the liquid ammonia or its carbonate be used, but it must be a very diluted solution. The only photographs on which I have used it with any success are those prepared with the phosphate of silver; and to these it imparts a red tinge, which is fatal to their use for transfers.

The ferrocyanate of potash, or, as it is more commonly called, the prussiate of potash, converts the chloride into a cyanide of silver, which is not susceptible of change by light; consequently this cheap salt has been employed as a fixing agent, but, most unfortunately, photographs which have been subjected to this preparation are slowly but surely, obliterated in the dark.

The iodide of silver, which is readily formed by washing the photograph with a solution of the iodide of potassium, is scarcely sensitive to light; and this salt, used in the proportions of five or six grains to four or five ounces of water, answers tolerably well where transfers are not required. It tinges the white lights of the picture of a pale yellow,—a color which is extremely active in absorbing the chemical rays of light, and is therefore quite inapplicable where any copies of the original photograph are required; and, in describing the hydriodated photographs, other objections will be noticed.

Of all the fixing agents, the hyposulphite of soda is decidedly the best. This was first pointed out by Sir John Herschel, who also recommended that it should be used warm in some cases: yet it was afterwards included in Mr. Fox Talbot's patent claim.

Hyposulphite of soda is manufactured very cheaply, or it can be prepared by the chemical amateur in the following manner:—

Form, in the first instance, a solution of caustic soda, by dissolving a pound of soda in a quart of boiling water, and mixing it, while hot, with half a pound of fresh burnt lime, slaked with another quart of boiling water. The mixed solution is to be carefully covered from the air until cold. The clear liquid is then to be poured off, and

made to dissolve, by boiling in an earthen vessel, as much sulphur as possible. The deep yellow solution formed is to be decanted off into a deep vessel, and a current of sulphurous acid gas passed through it until it becomes quite colorless. This is very easily done by mixing in a retort with a long beak, some linseed oil and sulphuric acid. On applying a little heat, the sulphurous acid gas is given off in great abundance. By plunging the beak to the bottom of the vessel, it passes through, and is rapidly absorbed by the solution. If it is desired to crystallize the hyposulphite, the fluid should not be allowed to become quite free of color. Whilst still a little yellow, it should be filtered and evaporated, in a porcelain or earthen vessel, over a quick fire, to the consistence of a syrup. The liquid thus evaporated is mixed with half its volume of alcohol and well shaken. The alcohol takes up all the sulphuret, and floats above; the lower solution is left to cool under the alcoholic one.

The hyposulphite of soda must be preserved in well-stoppered glass bottles, and never be exposed to any bright light. It is best to keep it in small bottles, as the action of the oxygen of the atmosphere has a tendency to form a sulphate, and precipitate the sulphur.

To use the hyposulphite of soda with effect, there are several precautions necessary. In the first place all the free nitrate of silver must be dissolved out of the paper by well washing; the photograph is then to be dried, and, being spread on a plane surface, is to be washed over on both sides with a saturated solution of the hyposulphite of soda. The picture must then be washed, by allowing a small stream of water to flow over it, at the same time dabbing it with a piece of soft sponge, until the water passes off perfectly tasteless. This operation should be repeated twice, or, in particular cases, even three times. The hyposulphite of soda has the property of dissolving a large quantity of several of the salts of silver, but particularly of the chloride, with which it combines, forming a triple salt of an exceedingly sweet taste. This salt is liable to spontaneous decomposition, accompanied with separation of silver in the state of sulphuret: hence the necessity of freeing the paper, by washing, of every trace of it, the sulphuret of silver

being of a dry brown. It might appear that the use of warm water would more effectually cleanse the paper; so far from it, it occasions the immediate formation of the sulphuret of silver.

Some operators prefer leaving the picture in a bath of the hyposulphite of soda for some time and then removing the salt by simple immersion in water, frequently changing it. The advantages of this appear to be, that the surface of the paper is not disturbed by any rubbing action or by the mechanical action of water flowing over the surface. For fixing the calotype pictures, Mr. Cundell, to whom we are much indebted for improvements in this particular process, recommends the following mode of manipulation:—

The picture, or as many of them as may be, is to be soaked in warm water, but not warmer than may be borne by the finger; this water is to be changed once or twice, and the pictures are then to be well drained, and either dried altogether, or pressed in clean and dry blotting paper, to prepare them to imbibe a solution of the hyposulphite of soda, which may be made by dissolving an ounce of that salt in a quart of water. Having poured a little of the solution into a flat dish, the pictures are to be introduced one by one; daylight will not now injure them: let them soak for two or three minutes, or even longer, if strongly printed, turning and moving them occasionally. The remaining unreduced salts of silver are thus thoroughly removed by soaking in water and pressing in clean blotting paper alternatively; but if time can be allowed, soaking in water alone will have the effect in twelve or twenty-four hours, according to the thickness of the paper. It is essential to the success of the fixing process, that the paper be in the first place thoroughly penetrated by the hyposulphite, and the sensitive matter dissolved; and next, that the hyposulphite compounds be effectually removed. Unless these salts are completely washed out, they induce a destructive change upon the picture, they become opaque in the tissue of the paper, and unfit it for the preparation of being copied.

Being desirous, not merely of describing all those processes which have passed into common use, but those even which have been suggested merely upon the strength

of a few experiments, where these appear probable to lead to any improved practice, under any circumstances, in the art, the following process of Reuben Phillips is introduced.

Mr. Phillips found that the solvent power of any menstruum was increased by voltaic action. He therefore employed electrodes the size of the photographic picture to be fixed, and placing upon the under one a flannel wetted with the solvent—either common salt, ammonia, or hyposulphite of soda—he placed the impressed paper, wetted with the same solution, on it, and laid another wetted flannel upon it, covering the whole with the other electrode. Connection being made with a tolerably active battery, the metallic salt is rapidly removed to one pole, and thus the fixing process rendered comparatively short and easy, where a voltaic battery is at command.

The hyposulphite of soda has been used for almost every photographic process, from the facility it affords for removing the silver salts. The following is the process of Gustave Le Gray, of Paris, which is valuable as being the directions of one who has produced most beautiful pictures: but it does not differ in any important particulars from the processes already given:—

“Make in a bottle the following solution:—Filtered water, about a pint and a half; hyposulphite of soda, about three ounces; cover the bottom of a dish with this, and plunge in your negative proof, taking care to avoid air-bubbles: this dissolves the bromo-chloro iodide of silver, but does not attack the gallo-nitrate of silver, which forms the blacks.

“Never put more than one proof at a time in the bath; but you may use it for several proofs one after the other.

“If you examine the proof as a transparency after it has remained some time in the bath, you may be tempted to think it is lost, as in some places spots will appear from the iodide of silver not being completely taken away; but if you wait until it is removed, which you will know by the disappearance of the yellow tint, you will be astonished at the whiteness and transparency of the paper, as well as at the beauty of the blacks in the image.

“It will require for this, to remain in the bath from half an hour to three quarters; you will then wash it in several

waters, and leave it in a basin of clear water for three quarters of an hour; then let it dry spontaneously by hanging it up; the proof is then quite unalterable by light, as there remains nothing more in the paper than the gallo-nitrate of silver, which is black.

“Fixing by the means of the bromide of potassium is not so durable, because it does not remove any of the materials used in preparing the paper. It may, nevertheless, be of great use in traveling, and when it is required to make several proofs one after another; because then you avoid touching the hyposulphite in preparing the negative paper, which spots at least contact with it.

“You may thus place the whole of your negative proofs together in this bath.

“Water, a pint and three quarters; bromide of potassium, 360 grains.

“In taking the proof out of the bath, you must wash it in several waters and dry it; it should be kept in the bath at least three quarters of an hour, but, if you leave it in two or three hours, it will not injure it.”

Such is M. Le Gray's statement, and so it is rendered by his English translator, Mr. Cousins; but I believe the quantity of the bromide of potassium to be by far too large, and that the pictures would sustain less injury by using a solution of one half the strength indicated. His process for fixing the positive pictures contains some important hints.

“Dissolve in a bottle hyposulphite of soda, 1500 grains;

“Filtered water, nearly a quart.

In another bottle dissolve 75 grains of nitrate of silver in a wine-glass or two of water; when well dissolved, you add to it saturated solution of chloride of sodium, until the white precipitate ceases to fall; allow it to repose a short time, and then decant the clear liquor, and gather the precipitate of chloride of silver, which you dissolve in the other bottle of hyposulphite of soda; by this means you obtain directly the black tints upon the picture. The older the hyposulphite is, the better; when it gets thick, you must add a fresh solution of hyposulphite alone, without the chloride of silver, the old containing an excess, which it has taken from the proofs already immersed in it. You must not fill

ter it to take away the deposit, but only let it repose in a large bottle, and decant the clear liquid for use, leaving the sediment to be redissolved by fresh solution.

"By leaving the proofs a longer or shorter period in the bath, you can obtain all the tints from the red to the black, and clear yellow; with a little practice, you will be sure to get the tint you desire. You must not leave a proof less than an hour in the bath for it to be sufficiently fixed, and it can remain three or four days to obtain the sepia and yellow. By heating the hyposulphite of soda I accelerate the operation; but we must not then leave the proof for an instant to itself, as the rapidity of action is so great, that the picture might be completely effaced.

"By adding to the preceding solution about one fluid ounce of liquid ammonia, I obtain pretty bister tints, and very pure whites. The English paper is exceedingly good for these tints.

"I obtain also fine velvet-like tints by putting the photograph (when taken out of the hyposulphite of soda) upon a bath of a salt of gold, using 15 grains of the chlorine of gold to one pint and a half of distilled water.

"Fine yellow tints are obtained by placing the proof (if too vigorous) first in a bath of hyposulphite, and then in a bath composed of one pint and a half of water, and one fluid ounce and a half of hydrochloric acid; washing it perfectly in water. Liquid ammonia, employed in the same quantity as last mentioned, gives remarkably fine tints.

"When the proof is the color you desire, wash it in several waters, and leave it two or three hours in a basin of water, until, touching it with the tongue, you perceive no sweet taste which indicates the presence of hyposulphite of silver; then dry it by hanging it up, and it is finished. The bath may contain as many proofs as can be conveniently placed in it."

The following fixing processes are rather more curious than useful: they were first indicated by Sir John Herschel, from whose memoir on the "Chemical Agency of the Rays of the Solar Spectrum" I quote.

"By far the most remarkable fixing process with which I am acquainted, however, consists in washing over the picture with a weak solution of corrosive sublimate

and then laying it for a few moments in water. This at once and completely *obliterates* the picture, reducing it to the state of perfectly white paper, on which the nicest examination (if the process be perfectly executed) can detect no trace, and in which it may be used for any other purpose, as drawing, writing, &c., being completely insensible to light. Nevertheless, the picture, though invisible, is only dormant, and may be instantly revived in all its force by merely brushing it over with a solution of a neutral hyposulphite, after which, however, it remains as insensible as before to the action of light. And thus it may be successively obliterated and revived as often as we please. It hardly requires mention that the property in question furnishes a means of painting in mezzotinto (*i. e.*, of commencing on black paper and working in the lights), as also a mode of secret writing, and a variety of similar applications.

"There is a remark which ought not to be omitted in regard to this part of our subject—viz., that it makes a great difference, in respect of the injury done to a photographic picture by the fixing process, whether that picture have been impressed by the long continued action of a feeble light, or by the quick and vivid one of a bright sun. Even supposing the pictures originally of equal intensity, the half-tints are much less powerfully corroded or washed out in fixing in the latter case than in the former."

CHAPTER VII.

ORDINARY PHOTOGRAPHIC PROCESSES ON PAPER OF THE EARLIEST VARIETY.

It has already been noticed that Wedgwood was certainly the first that made any attempts to use the sunbeam for delineating the objects through which it permeated. In 1802 he published an account of his process in the Journal of the Royal Institution, under the following title, "An Account of a Method of Copying Paintings upon Glass, and of making Profiles by the Agency of Light upon Nitrate of Silver; with Observations by H. Davy." From this paper the following extracts, containing the more important indications, are made.

"White paper, or white leather, moistened with solution of nitrate of silver, un-

dergoes no change when kept in a dark place, but, on being exposed to daylight, it speedily changes color, and after passing through different shades of grey and brown, becomes at length nearly black. The alterations of color take place more speedily in proportion as the light is more intense. In the direct beam of the sun, two or three minutes are sufficient to produce the full effect; in the shade, several hours are required; and light transmitted through different colored glasses acts upon it with different degrees of intensity. Thus it is found that red rays, or the common sunbeams, passed through red glass, have very little action upon it; yellow and green are more efficacious; but blue and violet light produce the most decided and powerful effects.

"When the shadow of any figure is thrown upon the prepared surface, the part concealed by it remains white, and the other parts speedily become dark. For copying paintings on glass the solution should be applied on leather; and in this case it is more readily acted on than when paper is used. After the color has been once fixed on the leather or paper, it cannot be removed by the application of water, or water and soap, and it is in a high degree permanent. The copy of a painting or the profile, immediately after being taken, must be kept in an obscure place; it may, indeed, be examined in the shade, but in this case the exposure should be only for a few minutes; by the light of candles or lamps, as commonly employed, it is not sensibly affected. No attempts that have been made to prevent the uncolored parts of the copy or profile from being acted upon by light, have as yet been successful. They have been covered by a thin coating of fine varnish, but this has not destroyed their susceptibility of becoming colored; and even after repeated washings, sufficient of the active part of saline matter will still adhere to the white parts of the leather or paper to cause them to become dark when exposed to the rays of the sun. Besides the applications of this method of copying that have just been mentioned, there are many others; and it will be useful for making delineations of all such objects as are possessed of a texture partly opaque and partly transparent. The woody fibres of leaves, and the wings of insects, may be

pretty accurately represented by means of it, and in this case it is only necessary to cause the direct solar light to pass through them, and to receive the shadows upon leather.

"The images formed by means of a camera-obscura have been found to be too faint to produce, in any moderate time, an effect upon the nitrate of silver. To copy these images was the first object of Mr. Wedgwood in his researches on the subject; and for this purpose he first used nitrate of silver, which was mentioned to him by a friend as a substance very sensible to the influence of light; but all his numerous experiments as to their primary end proved unsuccessful. In following these processes I have found that the images of small objects, produced by means of the solar microscope, may be copied without difficulty on prepared paper. This will probably be a useful application of the method: that it may be employed successfully, however, it is necessary that the paper may be placed at but a small distance from the lens.—(Davy.)

"In comparing the effects produced by light upon muriate of silver with those produced upon the nitrate, it seemed evident that the muriate was the most susceptible, and both were more readily acted upon when moist than when dry—a fact long ago known. Even in the twilight, the color of the moist muriate of silver spread upon paper, slowly changed from white to faint violet; though under similar circumstances, no immediate alteration was produced upon the nitrate.

"Nothing but a method of preventing the unshaded parts of the delineations from being colored by exposure to the day is wanting to render this process as useful as it is elegant."

In 1839, Mr. Fox Talbot published the first account of his *Photogenic* experiments. This term was introduced by this gentleman: and his experiments cannot be better described than in his own words.

CHLORIDE OF SILVER.—"In order to make what may be called ordinary photogenic paper, I select, in the first place, paper of a good firm quality and smooth surface. I do not know that any answers better than superfine writing paper. I dip it into a weak solution of common salt, and wipe it dry, by which the salt is uni-

formly distributed throughout its substance. I then spread a solution of nitrate of silver on one surface only and dry it at the fire. The solution should not be saturated, but six or eight times diluted with water. When dry, the paper is fit for use.

"I have found by experiment that there is a certain proportion between the quantity of salt and that of the solution of silver which answers best, and gives the maximum effect. If the strength of the salt is augmented beyond this point, the effect diminishes, and, in certain cases, becomes exceedingly small.

"This paper, if properly made, is very useful for all photogenic purposes. For example, nothing can be more effective than the images it gives of leaves and flowers, especially with a summer sun,—the light, passing through the leaves, delineates every ramification of their nerves.

"Now, suppose we take a sheet thus prepared, and wash it with a *saturated* solution of salt and then dry it. We shall find (especially if the paper is kept some weeks before the trial is made) that its sensibility is greatly diminished, and, in some cases, seems quite extinct. But if it is again washed with a liberal quantity of the solution of silver, it becomes again sensible to light, and even more so than it was at first. In this way, by alternately washing the paper with salt and silver, and drying it between times, I have succeeded in increasing its sensibility to the degree that is requisite for receiving the images of the camera-obscura.

"In conducting this operation, it will be found that the results are sometimes more and sometimes less satisfactory, in consequence of small and accidental variations in the proportions employed. It happens sometimes that the chloride of silver is disposed to darken of itself without any exposure to light: this shows that the attempt to give it sensibility has been carried too far. The object is to *approach* to this condition as near as possible without *reaching* it, so that the substance may be in a state ready to yield to the slightest extraneous force such as the feeble impact of the violet rays when much attenuated. Having, therefore, prepared a number of sheets of paper with chemical proportions slightly different from one another, let a piece be cut from each, and, having been duly

marked or numbered, let them be placed, side by side, in a very weak diffused light for a quarter of an hour. Then, if any one of them, as frequently happens, exhibits a marked advantage over its competitors, I select the paper which bears the corresponding number to be placed in the camera-obscura."

The increased sensitiveness given to paper by alternate ablutions of saline and argentine washes—the striking differences of effect produced by accidental variations of the proportions in which the chemical ingredients are applied—and the spontaneous change which takes place even in the dark, on the more sensitive varieties of the paper, are all subjects of great interest, which demand further investigation, and which, if followed out, promise some most important explanations of chemical phenomena at present involved in uncertainty, particularly those which appear to show the influence of time—an element not sufficiently taken into account—in overcoming the weaker affinities. Few fields of research promise a greater measure of reward than these; already the art of making sun pictures has led to many very important physical discoveries, but most of the phenomena are yet involved in obscurity.

The proportions in which the nitrate of soda has been used are exceedingly various; in general, the solution has been made too strong; but several chemists have recommended washes that are as much too weak. For different uses, solutions of various qualities should be employed. It will be found well in practice to keep papers of three orders of sensitiveness prepared; the proportions of salt and silver for each being as follows:—

Sensitive Paper for the Camera-Obscura.

Muriate of soda, thirty grains to an ounce of water.

Nitrate of silver, one hundred and twenty grains to an ounce of distilled water.

The paper is first soaked in the saline solution, and after being carefully wiped with linen, or pressed between folds of blotting-paper and dried, it is to be washed twice with the solution of silver, drying it by a warm fire between each washing. This paper is very liable to become brown in the dark. Although images may be obtained in the camera on this paper by

about half an hour's exposure, they are never very distinct, and may be regarded as rather curious than useful.

Less Sensitive Paper for copies of Engravings—Botanical or Entomological specimens.

Muriate of soda, twenty-five grains to ounce of water.

Nitrate of silver, ninety grains to an ounce of distilled water.

Applied as above directed.

Common Sensitive Paper, for Copying Lace-work, Feathers, Patterns of Watch-work, &c.

Muriate of soda, twenty grains to an ounce of water.

Nitrate of silver sixty grains to an ounce of distilled water.

Applied as above directed.

This paper keeps tolerably well, and, if carefully prepared, may always be depended upon for darkening equally.

The combinations of organic bases with lead and the argentine salts have been already described in Chapter IV.

IODIDE OF SILVER.—This salt was employed very early by Talbot, Herschel, and others. It enters as the principal agent into Mr. Talbot's calotype paper; but a description of this process is reserved for a separate chapter. Paper is washed with a solution of the iodide of potassium, and then with nitrate of silver. By this means papers may be prepared which are exquisitely sensitive to luminous influence, provided the right proportions are hit; but, at the same time, nothing can be more insensible to the same agency than the pure iodide of silver. A singular difference in precipitates to all appearance the same, led to the belief that more than one definite compound of iodine and silver existed; but it is now proved that pure iodide of silver will not change color in the sunshine, and that the quantity of nitrate of silver in excess regulates the degree of sensibility. Experiment has proved that the blackening of one variety of iodidated paper, and the preservation of another, depends on the simple admixture of a very minute excess of the nitrate of silver. The papers prepared with the iodide of silver have all the peculiarities of those prepared with the chloride, and although, in some instances,

they seem to exhibit a much higher order of sensitiveness, they cannot be recommended for general purposes with that confidence which experience has given to the chloride. It may, however, be proper to state the best proportions in which the iodidated papers can be prepared, and the most approved method of applying the solutions.

The finest kind of paper being chosen, it should be pinned by its four corners to a board, and carefully washed over with a solution of six grains of the nitrate of silver to half an ounce of water; when this is dry, it is to be washed with a solution of iodide of potassium, five grains in the same quantity of water, and dried by, but at some little distance from, the fire; then, some short period before the paper is required for use, it must be again washed with the silver solution, and quickly dried, with the same precaution as before. If this paper is warmed too much in drying, it changes from its delicate primrose color to a bright pink or a rosy brown, which, although still sensitive, is not so much so as the parts which are not so altered. The peculiar property of this salt to change thus readily by calorific influence, and some other very remarkable effects produced on already darkened paper when washed with a hydriodic salt, and exposed to artificial heat, or the pure calorific rays of the spectrum, which will be hereafter noticed, appears to promise a process of drawing of a new and peculiar character. Opening as this does a wide range of highly interesting and most important experiments, it is to be hoped some one may pursue the subject, and endeavor to establish the peculiar phenomena which present themselves on some scientific basis.

If iodide of silver is precipitated by mixing together solutions of iodide of potassium and nitrate of silver in a concentrated state, a heavy yellow powder falls, which will scarcely change in color by an exposure of many days to sunshine. But if the solutions are infinitely diluted, so that on mixing they only become milky, and the light powder which occasions the opacity falls but slowly to the bottom of the vessel, it will be found that it is sensitive to the weakest solar radiations. There does not appear to be any chemical difference between the iodides thus obtained; but there

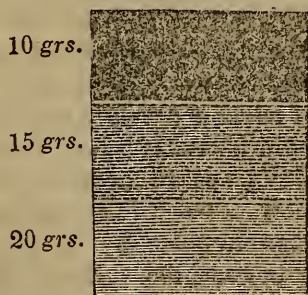
are some remarkable physical peculiarities, and it is believed that attention to these will be found eventually to be of the utmost importance.

BROMIDE OF SILVER.—In many of the works on chemistry, it is stated that the chloride is the most sensitive to light of all the salts of silver; and, when they are exposed in a perfectly formed and pure state to solar influence, it will be found that this is nearly correct. Modern discovery has, however, shown that these salts may exist in peculiar conditions, in which the affinities are so delicately balanced as to be disturbed by the faintest gleam; and it is singular that, as it regards the chloride, iodide, and bromide of silver, when in this condition, the order of sensibility is reversed, and the most decided action is evident on the bromide before the eye can detect any change in the chloride.

The slight additional expense of the bromides is not worthy consideration, particularly as their use may be confined to papers for the camera-obscura, the pictures on which are of course of the negative character, and the positive photographs can be formed by transfer on the chloridated papers of a highly sensitive kind.

It will be found that the bromide and iodide are much alike in the singular want of sensibility which they sometimes exhibit under the circumstances already alluded to, which are not easy of explanation.

If a paper first washed with a solution of nitrate of silver has bromide of potassium applied to it in different proportions, say 20 grains, 15 grains, and 10 grains each,



24.

in two drachms of water, and, when dry, be again washed over with the silver solution, it will be found, unless, as is occasionally the case, some organic combination interferes, that the order of sensitiveness will begin with the weakest solution, the

strongest being the least influenced by light. The different degrees of darkness induced are fairly represented in the margin. As the different bromides give to the photographic paper varieties which much resemble those enumerated under the muriates, I have thought it unnecessary to give an account of any of them. The paper prepared with the bromide of potassium is the kind I have adopted, after having tried upwards of two hundred combinations of silver with the other bromides.

To prepare a highly sensitive paper of this kind, select some sheets of very superior glazed post, and wash it on one side only with bromide of potassium—forty grains to one ounce of distilled water, over which, when dry, pass a solution of one hundred grains of nitrate of silver in the same quantity of water. The paper must be dried as quickly as possible without exposing it to too much heat; then again washed with the silver solution, and, when dry, carefully preserve for use.

It will be perceived that I adopt a slightly different manipulation from that recommended by Mr. Talbot. Instead of washing the paper with the solution of silver first, and applying the bromide or the muriate over this, and then the silver wash again, I use the alkaline salt first, and apply the metallic washes one on the other. I have been induced to this from observing that the photographic preparation penetrates less deeply into the paper than when laid on as originally prescribed, and, consequently, the sensibility of it is increased. It will be found that an addition of about one-twelfth of spirits of wine to the solution of silver will much increase the blackness of the paper when solarised; and I think we may safely say that the sensibility is also improved by it,—at all events it is not impaired.

M. Biot has expressed his opinion, that it is not possible to find any substance more sensitive to light than the bromide of silver: this is true to a certain extent, but in combination with deoxidizing agents, other preparations will be named which have a decided superiority over the pure bromide of silver.

FLUORIDE OF SILVER.—The use of this salt appears to have been first suggested by Sir John Herschel; it forms the basis

of a process by the author, to be described in the chapter on Special Processes. It has lately been claimed as a new photographic agent by the French, but the date of publication determines this question in the author's favor.

PHOSPHATE OF SILVER.—Dr. Fyfe appears to have been the first to suggest the use of the phosphate of silver as a photographic material, but I am obliged to confess it has not, in my hands, proved anything like so successful as, from Dr. Fyfe's description, it was in his own. Indeed, he himself observes, in speaking of its use in the camera-obscura :—" Though representations may be got in this way, yet, so far as I have found, they have not the minute distinctness of those got by the method already mentioned (*i. e.* by application.) Owing to the interference of the lens, the light does not act nearly so powerfully on the paper, as when it has to permeate merely a frame of glass."

For all practical purposes, the method which Dr. Fyfe has given of preparing these papers is, perhaps, the best ;—" The paper is first soaked in the phosphate of soda and then dried, after which the nitrate is spread over one side by a brush ; the paper again dried, and afterwards again put through the salt, by which any excess of silver is converted to phosphate. As thus prepared, it acquires a yellow tinge, which becomes black by exposure to light." It will be evident from these directions, that what was formerly said about the necessity of having the nitrate of silver in excess, is here, according to Dr. Fyfe, objectionable. It certainly does not appear to be so essential in this preparation, that anything but pure phosphate of silver should be used, yet I cannot help fancying that a slight advantage is gained, even here, by allowing a little excess of nitrate. Dr. Fyfe has given a process for applying the phosphate of silver, mixed as a paint, on metal, glass, or paper. It, however, requires the skill of an artist to produce an even surface, and unless a uniform ground is given, the picture is deformed by waving lines of different shades. A method of precipitating argentine salts on small surfaces will be given in the following pages, by which means the most uniform face is procured, and many beautiful effects produced.

PAPERS PREPARED WITH OTHER SALTS OF SILVER.—With the exception of the carbonate, tartrate, acetate, citrate, oxalate, and one or two others, the salts of silver, besides those already described, do not appear to be sensibly influenced by light. Many have been mentioned by authors as absolutely insensible to its influence ; but recent experiments have produced modifications of these salts, which are delicately sensitive to the solar ray. Amongst others, the chromate has been named, and certainly it has not yet been rendered sensitive to an exposure of some hours to daylight ; but one experiment of mine has proved, that the solar beam will in a few days, produce a fine revival of metallic silver from its chromate ; and another experiment with it has the most pleasing result of bringing within the range of probabilities the production of photographic pictures in their natural colors.

Researches having this object in view led to the discovery of the *chromatype* ; but this beautiful salt has not yet been applied directly as the photographic agent. In the present state of our knowledge, we cannot venture to affirm that any salt of silver, or, indeed, of any of the other metals, exists, having an absolute insensibility to light, or in which the required unstable equilibrium may not be induced, so that the sun's beam might change the character of its combinations. I am, indeed, convinced that no body in nature is entirely uninfluenced by the action of the sun's rays. Papers washed with either of the alkaline carbonates, and then with a solution of nitrate of silver, resemble in their character those prepared with the muriates, but are not darkened so readily.

The tartrate of silver possesses some very extraordinary peculiarities. Papers may be prepared, either by spreading the tartrate at once over the surface, or better, by soaking the paper in a solution of Rochelle salt (the tartrate of potash and soda), and then applying two washes of the solution of nitrate of silver. The first action of light is very feeble, but there gradually comes on a stronger discoloration, which eventually proceeds with rapidity, and at length blackens to an extent beyond almost every other paper. This discoloration may be wonderfully accelerated by washing over the tartrated paper with a

very dilute solution of the hydriodate of potash, during the process of darkening. It is not easy to use this when copying anything, but there are cases in which the extreme degree of darkness which this preparation acquires renders it valuable. The acetate of silver comports itself in the same manner as the tartrate. The citrate, oxalate, &c. are only interesting as forming part of the series of argentine preparations which exhibit decisive changes when exposed to light. The methods of rendering them available will be sufficiently understood from the foregoing details, and it would only be an unnecessary waste of words to give any more particular directions as it regards them.

Notwithstanding the extraordinary degree of sensibility which has been given to paper and to the metallic plates by the industrious experiments of chemists, I am convinced that we may hope to obtain agents of far higher natural sensibility than those we now possess; and I look with much anxiety to some of the combinations of organic radicals with metallic bases. The fulminates and the ethyle compounds present a very promising line of inquiry. Mr. John Towson, of Devonport, who pursued, conjointly with myself, a most extensive series of researches on photographic agents, was endeavoring to form a solution of silver, in which the elements should be so delicately balanced as to be overturned by the action of the faintest light. To do this, he dissolved some very pure silver in nitric acid, to which spirits of wine was added somewhat suddenly in proportions equal to the acid used, and the precipitation of the fulminate prevented by a quick effusion of cold water, sufficient to bring

the specific gravity of the solution to 1.17, and to this a few drops of ammonia were added. Pieces of blank post paper dipped in this solution became, the instant they were presented to the declining light of an autumnal evening, a beautiful black having a purple tinge. This effect did not seem to come on gradually, but, as by a sudden impulse, at once. Both this gentleman and myself have often endeavored to repeat this, but in no one instance have either of us succeeded in producing anything nearly so sensitive. It should be stated, that the solution prepared in the evening had become, by the following morning, only ordinarily sensitive, and that papers prepared with it were deliquescent and bad. In repeating any modification of this experiment, the greatest care should be taken, as explosions of considerable violence are otherwise likely to occur.

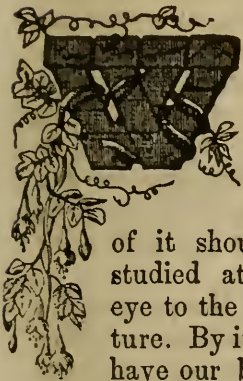
Another series of experiments on the fulminates of silver have produced very pleasing photographic results, but I am not enabled to specify any particular method of preparing them, which may be certain of reproducing the results to which I allude. Nothing can be more capricious than they are: the same salt darkening rapidly to-day, which will to-morrow appear to be absolutely insensible to radiation, and which will again, in a few days, recover its sensitiveness, to lose it as speedily as before.

The beautiful researches of Professor Frankland, of Owen's College, Manchester, however, most satisfactorily prove that a great many of the metals will combine with organic radicals in the sunshine which will not so combine in darkness.

TO BE CONTINUED.

CORRESPONDENCE.

ARRANGEMENT OF LIGHT.



HILE I am at it I will give you a few hints for the Journal on the arrangement of light. This is a subject for the daguerrean so important that no light or shade

of it should be omitted to be studied attentively, and with an eye to the improvement of his picture. By it we live, and move, and have our being—as daguerreotypists. You will notice that in the pictures I send you, although they are facing each other in position, yet the high light in the eye in each picture, falls in the same position on the eye. And although my skylight is ten feet high in the lowest place, and I sit my subjects in any part under the light, yet you see no heavy black shades under the brows, nose or chin—now how is this avoided?—Thus I avoid these objections and produce any degree of light or shade I choose:—

I have a mirror, 20 x 30 inches, placed in a frame set on castors, so as to swing on the centre by having a bolt or rod run through the frame that supports the glass, also the glass frame; this can readily be brought round to any position with the sitter you choose, and by turning it to the desired angle bring the light down on the face or person in any place you choose. With this arrangement you need no side light—and your skylight may be of any height; in fact a high light will give a softer picture. To avoid too strong a light on the top of the head, have a brass or iron wire bow or oblong hoop covered with blue or white tissue paper, or light blue muslin, and fastened to some movable stand, so arranged as to raise or lower. I use one of Lewis' head rests with the head support taken out, and the wire fitted in the hole of the top screw, which is removed. All my side screens are made so as to swing in a frame, which frames are set on castors. In this way by care and observation you can obtain any light and shade you wish. Of course the mirror cannot well be used

where the sitter is so placed that the high light reflects in the eye from the skylight or side window. Unless these bring the light where desired they must be shaded off, and the mirror brought in use. If the mirror makes the light in the eye too large, cover any desirable portion of it with a black or green cloth for the purpose.

Truly your friend,

A. HESLER.

ENLARGEMENT OF DAGUERREOTYPES IN COPYING.

Charleston, June 15, 1852.

H. H. SNELLING, Esq.—Dear Sir:—Knowing your desire to be made acquainted with all the improvements in our beautiful art, I must note down for your perusal, and also for that of your numerous readers, a great achievement in the photographic art, and one which has hitherto been deemed impossible.

It is in reference to copying daguerreotypes larger than the original.

Mr. George S. Cook, of this city, has succeeded in producing a copy eight times the original size.

Mr. C. stands at the head of his profession, and has done the art infinite credit by his style of pictures, and withal he has kept up that standard of prices which has commanded the most respectable business.

It so happened that Mr. Cook was called upon a few days since by one of his customers to obtain a copy of a daguerreotype of a dear friend. As he was examining some of the specimens which adorn the gallery, his eyes chanced to fall upon some pictures, taken upon the double whole plate size, when he said he would cheerfully give five hundred dollars for one of his wife as large as those he saw before him.

"Nothing more easy," says Mr. Cook. "I can produce one like that: nor will I ask you to pay any more than the usual price for one of that size."

A quarter sized portrait was then handed Mr. Cook, and he actually succeeded in copying it upon a double whole sized plate, and that too with quite as much distinctness

as the original. Thereby achieving a feat certainly never before accomplished, if ever attempted.

The manner of arriving at this very surprising result was of course the labor of numerous experiments. The lenses used were those of a full sized camera, and he was obliged to arrange a dark chamber of great length, which was constructed of camera boxes, and black drapery, &c., terminating of course with the box containing the ground glass of a double whole plate camera.

By using a very small opening in his diaphragm he was enabled to produce a picture of great distinctness. The time required in the camera was *one hour*, which may appear unusually long, especially when we consider the light, (which was his ordinary light, where he copies daguerreotypes of medium and quarter sizes in thirty or forty seconds). But the great distance at which the plate was necessarily placed from the picture copied augmented the time, so that it actually required one whole hour to make the impression. The plate was nearly five feet from the original daguerreotype.

It need not be said now that anything is impossible in the art, when we can copy such pictures as the foregoing. And if our fellow laborers in the field would seek after other improvements, they would still find other new and wonderful discoveries worthy of their time and attention.

Trusting this brief notice of a new fea-

ture in the copying process may induce others to essay experiments, I would most respectfully suggest to all to give us their experience in copying daguerreotypes.— This branch of the business has not been brought to any very great degree of perfection. It should, however, for as the art attains greater age the demand for copies will increase. Because all those persons who have their portraits taken while in health and life, will, in the lapse of a few years, pass away, and their survivors will all wish copies; therefore, I conceive in this peculiar branch, there is a wide field for improvement.

I would urge it upon all that, taking the hint from Mr. Cook, we should see whether or not some manifest improvement may not be made in the actual manner of copying the daguerreotype.

We all know the present process is attended with great uncertainty, and indeed not with much satisfaction, when we are called upon to copy from an imperfect impression, and from that to produce one similar to those we take daily from life, which is frequently demanded.

There certainly can be some new arrangement of camera boxes whereby the light can be made to fall upon the original so as to avoid all reflections, and produce copies equal to the original.

Hoping this may elicit other communications on this subject, I will subscribe myself

Yours, most respectfully,

N. G. BURGESS.

GEMS OF THE GREAT EXHIBITION, says the London Art-Journal, is the title given to a series of internal views of the Crystal Palace with its late contents, which Mr. G. Baxter is producing by his patent process of printing in oil. Two subjects have already made their appearance, and they certainly surpass all his former clever and ingenious efforts; we can only compare them to very highly finished pictures on

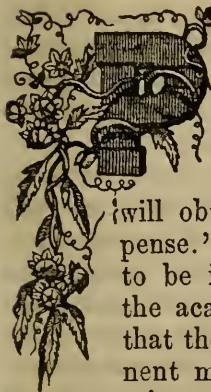
ivory, so delicate and soft is their general tone, and yet rich and powerful in color. These views have been taken to exhibit some of the most popular groups of sculpture in the foreground, which are brought forward with infinite beauty and accuracy of drawing. They are altogether arranged with much artistic feeling, and are in every way worthy of the name which the inventor has given to them.

COLOR AND LIGHT.

BY M. ZIEGLER

Translated from the French, by Mrs. A. L. Snelling.

EXPOSITION OF THE PRINCIPLES.



LATON in his time, after having designated among several systems those which he preferred, adds, "If they do not prove that they have the superiority they will obtain our favor as a recompense." These fine words ought to be inscribed on the doors of all the academies. To prove, then, that the doctrine of such an eminent member has not the superiority, will be a title to his friendship! It is nothing evangelical, and I dare say, nothing new. These words contain all the doctrine of scientific progress. History affords us the example of certain errors, which were like the marches of science in search of truth. We also owe acknowledgment to the men who courageously make discoveries without fearing the implacable rancor of those who unite to laugh most implacably at others who fall into error. The painter desirous to bestow his attention upon the works of nature, hopes that he will be pardoned if he dare speak of colors, and that Messieurs, the Savans, will wish to take into consideration the influence of the palette, which has, during twenty years or more, displayed to all eyes their mixtures and their mysteries, although, meantime, he may not have cleaned any crystal, analyzed any substance, and that he declares himself a stranger to Algebraic formulas.

The time has come to make the grand laws of analogy agree with the works upon optics of the immortal Newton, and to assimilate them with the theory of the recent discovery of colors in photography. The painter knows that this task is out of his power. He has nothing but the honor of working, if it is impossible to arrive at the result by a feeble trial.

The idea circulated, after Newton, that light and color form only one body, is yet dominant in the learned world, but it has

had its time, and from all parts, current experiences not only combats and reverses it, but causes sandard works to turn gradually to the progress of truth. The time has come to separate light and color—to know their *extreme* characters, to determine the phenomenons which result from their union, as well in the luminous rays as in the sub-atmospheric formations, where the colored fluids have been condensed. If we carry into this Newtonian system of light and color, the details of experiments, if we abstract from the ingenious combinations of the prism that which has given it birth, we find a skeleton of doctrine comprising the following three points.

1. Bodies have not color in themselves, their colors are contained in the luminous rays. Light and color forming only one body.

2. There are seven primitive colors.

3. White is produced by the union of the primitive reflected colors. Black by the union of the primitive absorbed colors.

After long studies, and a profound examination, not having been able to be persuaded of the stability of this doctrine, in face of the incessant progress of science, and especially of the experiments in photography, we will say to the savans, our masters, if a sincere and respectful conviction merits some regard, our meditations, our experiences, agree with the indistinctive sentiment, THE FIRST MOVEMENT OF ALL MEN, we have conveyed our views in the following propositions, of which we wish them to take notice and examine.

1. The color of bodies appertain to them in the same manner as their form. Color is a body distinct from light.

2. There are only three primitive colors, which produce three mixed colors, and an infinite number of composite colors.

3. The mingling of the colors and of the colored rays never produce white nor the white light, but a result which can vary from grey to the most intense black.

We pray our learned lecturers to suspend for a moment all application of their traditional knowledge upon light and color. That they will give us attention, exempt from scientific precedence, and form no judgment without taking notice of the developments which follow.

FIRST PROPOSITION.

The color of bodies, properly appertaining to them, belongs to them as well as their form. The color is a body distinct from the light.

If the form is an abstraction which in no sense principally effects the sight or the touch, we may say that the color is an abstraction which exclusively effects the sight. Nature proceeds very simply in its formations. It gives to the body a form of which we cannot deny what Berkely says, the visible and tangible qualities belong to the body itself; and because the qualities of color not inherent to this body are not visible, and cannot be controlled by the touch, should we not consider such properties exclusive of the luminous rays. We cannot sustain any such proposition without derogating from the general law of the physical properties of matter. In his mathematical principles of natural history, Newton advances this assertion; that there is not an inch of matter in all the universe. At the same time that he wrote this book he occupied himself with his *treatise upon light and colors*. One can comprehend how this great man in such a state of mind could not deny the existence of color as he did that of body.

When deprived of sight, Michel Angelo prepared the marble for the antique statues; it would have been strange indeed, that, subject to such blindness, his fingers presented an illusion; that these forms, objects of his worship, were not owing to a physiological phenomenon; that they were the result of some decomposition of a fluid stirring upon the nervous pencil which transmitted the sensations to the brain. Among the blind this explication of form, that they have only the power of touching, logically, corresponds with the explanation of color given by the school of men who only perceive the colors by means of the sight.

You know that the ripe fruit detaches itself from the tree in a particular manner. The odor which is diffused emanates from

it, you will recollect that you attribute to this fruit taste and savor. You are convinced that these qualities are the product of the matter of which it is formed; and you do not perceive that you repel all the inspirations of nature and the laws of analogy in saying of this same body, its form is its own, its odor is its own, its delicious savor is its own, but its color is not its own but belongs to the luminous rays. Here the man of nature does not comprehend the reasoning man. We can soon prove that it is the man of nature who is the man of reason.

Guided by the sentiment of truth, by the perception called good sense, we shall not require anything to demonstrate, to prove the comparison of the phenomena of color, of form, of odor, or of savor; because they come under the name of the general law of being. If the savant pretends to sustain one of these phenomena connected with natural order, let him give his reasons, let him demonstrate, let him prove. One such exception ought to be a hundred times demonstrated and proved.

In saying that the color of bodies properly belong to them, I do not intend to affirm that the color exists only in these bodies. The color in a floating and imponderable state exists also in the atmosphere, acting with the light as with a vehicle, and it is separated under many circumstances. Some future time we shall know of what importance is this unknown agent in vegetable and metallic formations.

In the mean time I have to prove that the color belongs to the body. Besides the analagous means drawn from the laws of creation, I have recourse to an experiment conclusively made under my own eyes, by a distinguished optician, the 25th of January 1850. A red disk placed in the green of the luminous spectrum, produces a black disk; then the disk had preserved its own color which interfering with the green produced a composite color, and modified the green ray. The distinct properties—1st, of colored bodies; 2nd, of the prismatic green appearing distinctly in this circumstance; they concur in the formation of the composite color; or the composite color results from the union of the three colors; then the red disk does not owe its color to the luminous rays, since it takes part itself in the formation of the

blackish composite. Then in short its proper color is independent of the luminous rays.

The phenomena of light and color are so enchained, that to prove their principles it is necessary to cause ulterior propositions to intervene. Having spoken of the intensity of the color of certain bodies, that is such as this color cannot produce from the luminous rays, because that the latter only contain a quantity too weak to attain the coloration of these bodies, or more cannot produce less; a hundred cannot contain a million. A given quantity of weak color cannot produce an equal quantity of intense color, nor a superior quantity of equal color; consequently the bodies in which the color excels in intensity, that contained in the ray which lights them, a ray of which one can measure the surface by the section of the lighted body, are colored in themselves by all that exceeds the similar color contained in the ray.

By this observation I will prove that the coloration perceived, is produced by means of the light, which particularly belong to the bodies as well as their form. Then I shall call to my aid from these two vulgar proofs and from these sincere convictions, the fine and recent discoveries of M. Edmond Becquerel:—"If you have fixed" said I, "the colors of the spectrum upon a metallic plate, it is evident that these colors are material and independent of the light, otherwise you will have fixed the light itself. But your plate does not remain luminous, then you extract from the light the coloring matter."

"These images are not luminous, but they are colored," he replied; "and if by means of a lens, I unite the pencil of the colored rays, and project the focus upon the sensible plate, I obtain a disk of a *clear grey*."

Saying this, M. Becquerel drew from his pocket, and separated from its envelops, one of these plates of silver, exhibiting an evanescent impression of the luminous rays, which few persons have been able to see.

I do not attempt a description of these fine colors, lively and tinted with the order of the colors of the rainbow. I confine myself to drawing from it this conclusion; that the atmospheric color, materially susceptible of fixation and assimilation can be

separated from the light; in short that color is distinct from light.

M. Niepce de St. Victor has done more: having obtained upon a plate of silver prepared with chlorhydric acid, the colors of an image by means of the photographic process, he has taken off the metallic surface by detaching with his fingers some colored particles, and transferring them upon a sheet of white paper, as if it had been the wing of a butterfly.

This experiment was communicated to me by the author the 26th of last December.

If it is true that in the construction of mechanism the most simple means are the nearest to perfection, let us compare with this point of simplicity in view, the theory on colors we present with that which is now generally professed.

The most recent work, and most in vogue, is that of the learned and honorable director of the Gobelein dying establishment.

This eminent man has perfectly adapted his system to, and his experience agrees with, the systems acknowledged up to the present time. He thus argues in relation to the simultaneous contrast of colors.

"A ray of solar light is composed of an indefinite number of diversely colored rays; and because it is impossible to distinguish one from the other, for the reason that they cannot be distinguished from each other, and for the reason that they are not all different nor all equal. They are distributed in groups to which we give the name of *red rays*, *orange rays*, *yellow rays*, *green rays*, *blue rays*, *indigo rays*, and *violet rays*; but we do not say that all these rays are comprised in one group, such as *red* for example, which are identified by the color. We consider them generally on the contrary, as they differ more or less from each other, although definitely we recognize that the sensation produced separately enters into that which we attribute to the red light."

Let us add to complete this complicated theory, that the bodies which seem to us colored are not so, that they perform their office like sponges, but have contradictory dispositions,—that is to say they represent a sponge at the time distended and compressed, absorbing a certain quantity of

rays, and reflecting others; thus the scarlet absorbs all colors except the red ray. It is the same of all colors, tints, and tones, which it reflects; the color absorbed is the complementary of the visible color; the black results from absorption, the white from the reflection of all colors. Such is the general system professed at this time.

A philosopher has said: "To undermine or destroy an hypothesis, it is not necessary to carry it as far as it will go."

We shall endeavor to prove this hypothesis by experiments which we are going to relate.

If in a perfectly obscure place you suffer a ray of light to pass through the eye of a needle, and then present under this ray a scarlet stuff, the colors of the rays are absorbed with the exception of the red ray, and the stuff appears of a *scarlet* color. Under the same ray, if you present the purest ultra-marine, then the ray throws its complementary color of blue into the ultra-marine which reflects only a very vivid blue ray. If now you pass under this ray all the colors of creation, the crome, the *minoranges*, the glaring dahlia, then the wood colors, the chamois, the fawn color, the mossy bark—particolored gleams, this one stream of light contains all, and these bodies, so varied, which have each a distinct form, have only one color; they are more or less absorbents of the colors contained in the ray, and nothing more. What they do not absorb they reflect, and what they reflect is the color. Thus all the collections of roses in France, all the hyacinths and tulips of Holland, the geraniums and Azalias of England; all these colors; so vivid, so charming, to which the spectral rays do not approach, are unconnected with these flowers: they are all contained in the stream of light which passes through the eye of a needle. These brilliant corollas, I repeat, are only sponges which absorb such and such rays of the luminous stream and reflect the others.

These bodies are endowed by absorption, with election, since they choose the ray which belongs to them; and with all kinds of reflection, for often they are glittering, brilliant and colored at the same time.

But this ray which contains all the colors, does it contain them all to their height or maximum of *intensity*? That

is indispensable, for if I present to it Prussian blue, purple, or other color, how will it furnish to each the intense color belonging to it? or, as the intensity of the color is in an inverse ratio to the intensity of light, the philosopher, Newton, is arrested in his progress. He cannot say that the luminous ray contains even the concentrated tints; and in the meantime it is necessary that it should contain them; that is all the *blacks* by concentration. Thus this system would lead us to conclude that light contains darkness, that the white contains the black, and all the dark colors by concentration, since they are true colors as I shall soon demonstrate. Notwithstanding our respect for science and for learned men, by which many persons have attained a glorious name, we can only see in the scholastic explanation of the phenomenon of colors, a supposition of a phenomenon a thousand times more inexplicable, and we say: *the color of bodies belong to them as well as their forms; the color is a distinct body from the light. Such is our first proposition.*

SECOND PROPOSITION.

There are only three primitive colors. They produce three mixed colors, and an infinite number of composite colors.

The beautiful monuments of Athens reveal the progress of the arts among the Greeks—showing that in the reign of Pericles humanity attained an elevation to which nothing corresponds in the past. Since then Phidias remained the first statuary, Hippocrates the first physician, Ictinus the first architect, Sophocles and Euripides the first tragedians, Pythagoras, Plato and Aristotle the greatest philosophers. Art and science are united. Thus the professed doctrines of eminent men of a great epoch, merit all our respect. Apelles, the contemporary of these great geniuses recognised with Pliny four principal colors, *yellow, red, blue and white*. I ought to mention white first. Although too brief and impartially transmitted, this opinion, which is the base of the theory of the painters will be the point of departure from my second proposition.

PRIMITIVE COLORS.

The primitive colors are those which cannot be composed of any others, and cannot decompose any other.

The primitive colors are three in number.

1. Yellow. 2. Red. 3. Blue.

All the colors derived from these are infinite without exception.

MIXED COLORS.

A mixed color is the result of uniting two primitive colors, then three primitive colors produce three mixed colors. The union of yellow and red produces orange, yellow and blue produces green, blue and red produces violet.

Thus are the colors mixed which in this blending are united to the primitive colors by the intermediate shades, of which I shall indicate the principle in the following series: the RED, the *nasturtion tint*; the YELLOW, the *sulphur tint*; the GREEN, the *turquoise tint*; the VIOLET, the *garnet tint*; then to return to the red.

The number of tints in these numerous shades, is very great, and can be multiplied to an infinite extent.

A certain number of philosophers, either out of respect to Newton, or on account of the influence of the prism, deny the name of primitive to the colors, red, yellow, and blue. Haüy is of the number. In his treatise upon Philosophy, vol. ii., p. 219, this learned man combats that opinion, as his successors have since done. The first experiment on which Haüy's theory is grounded, on the impossibility of the luminous spectrum being decomposed by yellow and blue. The failure in this case, of the experimenter, is a conclusive proof of his mistake.

Whether the mixed colors are the result of a decomposable mixture, or of an indecomposable combination it is not less mixed: since it is practically composable, it is theoretically decomposable, whatever be the issue of the essays subsequently made to decompose it. Yet Haüy has been once more forgetful in affirming that we cannot decompose the green of the spectrum. The experiment for it is easy. If through a square hole you introduce the sun's rays into a dark room, and if you gradually bring near the prism the screen that supports the spectrum, you will see the yellow separate from the blue, and the green color be decomposed at the same time, the yellow and blue becoming entirely separated by a zone of white light, and the green no longer visible; this color is

therefore perfectly decomposable by the same prism which has composed it.

Instead of saying that the yellow, the red, and the blue, are the *indecomposable types* of color, I will say, the *incomposable types*. The difference will be more strongly expressed, the truth will be the same. The seven primitive colors delineated by the immortal Newton—known as the red, orange, yellow, green, blue, indigo, violet, poetically corresponds with the seven notes of music, do, re, mi, fa, sol, la, si, and are only an assemblage ingeniously arranged, of three mixed colors and one shade of indigo.

Except certain cases in which the luminous centre is unsustained by the combustion of the metals, it is remarkable that the spectrum comprises only the three mixed colors, the orange, the green, and the violet, which succeed each other without allowing a place for the primitive colors, which appears only in the form of unequal rays, when the light comes from a metallic combustion, so that if you were limiting yourself to the observation of the colors by means of a prism, you would obtain a very false notion of the three primitive colors which are found only accidentally in several exceptional circumstances.

The most splendid rainbow is also composed only of mixed colors. If then the prism has given birth to so many experiments, its usage has been fatal to the judgment pronounced concerning the colors. The first of the errors to which that instrument has contributed, is the division of colors into seven primitive ones.

The very best minds among the learned men, consider this division only as a conventional formula—a combining the different parts of the spectrum, powerless as it is—yet resulting in a conclusive fact.

I must confess that a primitive color entirely free from mixture with whatsoever particle of the complementary colors is rare enough but not impossible. Some red glasses in Cathedrals, are of so pure a tint, that we can see in them nothing orange, nothing violet, that is to say, neither yellow nor blue. The prism itself refracts no other tints but those of the red primitive color in all its purity.

There are flowers, like the coral, of a blue sage, which are free from red and yellow. But the ultra-marine contains some

red. The yellow, entirely pure, is found in the chromate of lead, and certain garden flowers.

Ignorant of the existence of bodies gifted with primitive color exempt from changes, some savans have leaned upon the supposition that there did not exist any color free from mixture and were led to deny the existence of the three primitive colors. We might as well deny the existence of Alcohol, because it can be rectified to such a point as not to contain a particle of water; deny vacancy because it is not perfect. I knew a philosopher, curious upon all scientific subjects, who assured me that red was decomposable, and that he could prove it by means of an instrument of his own invention. I repaired with the optician to the depository of this precious instrument, and I saw that in uniting the three together, three glasses of divers colors, we obtained a detestable red tint—composite tint sur-named rouge (or red) and in separating the elements of this brownish red we found a greenish orange, a greenish blue, and a greenish yellow. This telescope composed of seven glasses had for its object the representing the seven colors in a manner, the optician told me, which will re-unite them by superposition upon applying the white light. I returned from the reunity of this proposition and regarding the traverse of heaven to perceive the white light, I saw a black—a perfect black!

The security of certain savans before the public, is not one of the least phenomena of the time in which we live. Feeling themselves supported by a formidable power, they carry to such a bold extent the excitement of the school, that the fall is inevitable. I ought nevertheless to declare that the first experiment was altogether singular, that the portion of red contained in the orange exercised a powerful action upon the re-union of the mixed colors by the presupposition of the three transparent glasses.

Illustrious philosophers have remarked in each color of the spectrum a different degree of heat. The experiences of Herschel, Leslie, and Rochu, demonstrate that the red color has a heat from eight to sixteen times greater than the violet. Other experiments upon the luminous qualities of divers colors, made by Newton and Herschel, prove that the yellow is the most

luminous color. M. Edward Becquerel, to whom we owe a profound treatise on the effects produced by the solar rays upon various substances, demonstrates that all traces of the calorific rays disappear at a very little distance from the extremity of the red. The chemical rays, on the contrary, although they are not visible, extend beyond the extremity of the violet to an equal distance a little nearer to the two tiers of the apparent spectrum. Let us remark, nevertheless, that the chemical rays have for their principal character the property of blackening the salts of silver, and that divers points of the spectrum possess other kinds of chemical action; thus the yellow and the surrounding tints have the property of continuing the reductive action that the violet exercises on the salts of silver, and which has induced M. Becquerel to give to these rays the qualification of *continuators*. This double observation is of great interest to photography.

There will be, nevertheless, an error in believing that the chemical action of the violet color of the spectrum is a general law in nature; the color which belongs to the body has some different properties. We see in effect in the multiplied experiments in photography that the blue is after the white the color of which the action has the most influence; to the extent that the blue characters upon a white ground will not distinguish themselves in a proof well made; then even that the blue will be at its maximum height, provided that it be pure and that the object be at a sufficient distance. Then from the publication of my ceramic studies, wishing to lean upon the experience of some able photographer, I thought I ought to apply to M. Bayard, and therefore enquired of him what, in a drapery of blue or violet, that has equal intensity of tone, will have the most action upon the iodized plate. I received the following letter.

“MONSIEUR:—In reply to your request I will answer that, in the order of photogenic action the most decided colors or tints that experience has taught me to recognize, as the most impressionable after the white, are: 1st. Clear blue; 2nd. mallow; 3rd. lilac; 4th. rose; 5th. violet. The more these colors approach the white, the more active they are; this activity varies according as the colors are

mineral or vegetable, these last being a *little more* active; but there is no dependance upon them.

"Your devoted servant,
"BAYARD."

The assertions contained in this letter having been contested with ardor by a mathematician, who has written and published to the contrary, I resolved to make an experiment myself. Not being able to find stuffs of the same nature and equal intensity of tone, I composed upon the palette a blue and a violet, the conformity of which I equalized with care, and spread them upon a panel. The blue was of cobalt, the violet was a purple of madder of an irreproachable purity, and did not contain an atom of yellow. This second color was brought to the wished for tone by some white and cobalt. I repeated the same preparation with some prussian blue instead of cobalt, and I placed my two samples upon the same tablet. M. le Baron Gros wished to try some proofs of this panel, near which, to complete our observations, were placed several pieces of gold and silver. The result of this experiment was as follows. The blue became much more clear than the violet in each of the two trials, the cobalt clearer than the prussian blue, but less clear according to the depth of the white, (the panel was an extended paste board,) the pieces of gold were almost black, although very legible; those of silver being preserved clear in proportion to the relative nature of the surrounding objects.

This experiment which M. M. the photographers will regard as superabundant,

confirms at least a great truth; that is, that the *atmospheric* color combined with the luminous rays, has some different properties from the color belonging to the body. From this difference we deduce forcibly that the bodies have a distinct color, which is natural to them, as they have a distinct molecular form, which is also natural to them.—See the first proposition.

COMPOSITE COLORS.

The colors which I call composite, result from the combination, in whatever quantity it be, of the three primitive colors. Each combination, being susceptible of an infinite number of tones by their mixture with the white, and of an equally infinite number of tints by combination with all or part of each of the other tones; and with these tints, one can obtain an infinite variety of composite colors.

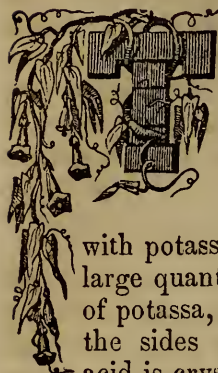
The question of the colors, primitive, mixed and *composite* will be further discussed in the third proposition. Resuming what I have said as to the indispensable existence of three primitive colors, I say: one can modify either in reality or theoretically all the forms of these bodies, but one cannot make any modification reducible to the law of the three dimensions of space, height, length and breadth. By the same mysterious law, one can modify the colors, tints and tones to infinity, but the yellow, the red, and the blue, will eternally remain the three types of indecomposed or indecomposable colors.

TO BE CONTINUED.

PALMER'S PATENT ENLARGING CAMERA.—A gentleman of the name of Palmer has long been engaged upon the construction of an instrument to permit the copying of any object, or series of objects, upon either a larger or smaller scale than the

original. He has at length succeeded in the most perfect and satisfactory manner; so much so, indeed, as to startle us with the astonishing effects produced by his process.—*London Art-Journal*.

ON ACIDS. I.—VEGETABLE ACIDS.*



TARTARIC ACID—is composed of four parts carbon, five parts oxygen and two parts of hydrogen. It is found in the fruit of many plants, more especially in the grape, in combination with potassa, and is manufactured in large quantities from the bi-tartrate of potassa, a crystalline substance on the sides of wine casks. Tartaric acid is crystallizable, very soluble in water, but not much in alcohol. It is converted into the oxalic by the action of nitric acid and heat. To obtain tartaric acid, dissolve the bitartrate of potassa in hot water, and add carbonate of lime; filter and wash the precipitate, diffuse it through water, and add dilute sulphuric acid; again filter, and evaporate the solution, when fine beautifully white crystals will form. Some manufacturers bleach the colored solution of the first crystals by treating it with animal charcoal; but for this purpose the latter substance should be first purified by digesting it in muriatic acid, and afterwards by adulterating it with water, and exposing it to a dull red heat in a covered vessel. The general management of this manufacture resembles that of citric acid. Tartaric acid fuses when heated, and after losing one-fourth its water is converted into *tartralic* acid, and by continuing the heat until another one-fourth of the water is driven off it is converted into *tartrelic* acid. By a higher heat it gives off all its water, and becomes anhydrous and insoluble. By distillation it yields pyrotartaric and pysmic acids with other products, and when strongly heated it is wholly dissipated. With the bases it forms salts called *tartrates*. It is chiefly used in calico printing, and in medicine, as a substitute for citric acid and lemon juice, for the preparation of cooling drinks. For the latter purpose, sesquicarbonate of soda is employed.

20 grains of crystallized tartaric acid are saturated by—

27 grs. of crystallized bicarbonate of potash.

22 grs. of commercial carbonate of potash.
22 grs. of cryst. sesquicarbonate of soda.
38 grs. of cryst. carbonate of soda.
15½ grs. of cryst. sesquicarbonate of ammonia.

TARTRELIC ACID.—This is distinguished from tartaric acid by saturating one-fourth less base, and by forming soluble salts with lime and baryta. By heat it is converted into *tartrelic* acid. This new acid possesses only half the neutralizing power of tartaric acid. In contact with water the tartralic and tartrelic acids and their salts are reconverted into tartaric acid and tartrates. Dry tartralic and tartrelic are isomeric compounds.

CAMPHORIC ACID.—The composition of this acid is unknown. It is prepared from camphor by putting one part of camphor and four parts of nitric acid into a glass retort connected with a receiver, and apply a gradually increasing heat until vapors cease to be evolved; then add the camphor that has been volatilized to the acid in the retort, along with four or five parts more of nitric acid. Repeat the process until twenty parts of nitric acid have been consumed. When the whole of the camphor has been acidified it will crystallize in the remaining liquor. When the whole is perfectly cold it must be thrown upon a filter, and well washed with distilled water, after which it must be dissolved in boiling water, evaporated to a pellicle, and set aside to crystallize. The crystals somewhat resemble those of muriate of ammonia, they are soluble in one hundred parts of cold, and in ten of hot water, and in about an equal weight of alcohol. They are soluble in the mineral acids, in the essential and fixed oils, and they are volatilized by heat. Camphoric acid has a taste resembling saffron, it reddens litmus paper and forms white feathery crystals.

SACCHARIC ACID is composed of thirty-three equivalents of carbon, 61.5 of oxygen and 4.9 of hydrogen. It is a weak acid, reddens litmus paper, and appears in the form of a white powder. It is insoluble in alcohol, and requires sixty parts of boiling water for its solution. It is decomposed by heat. It is obtained from

* Continued from page 345, Vol. 3, No. 6.

gum arabic digested in nitric acid over heat, one part of gum and three parts by weight of acid being used. These acids are the product of this decomposition, the oxalic, malic, and saccholactic; the latter is to be separated by the filter, well washed with cold distilled water, and digested with ammonia, filtered while hot and the solution evaporated nearly to dryness. The saccholactate of ammonia, after being well washed until the crystals become white, should then be dissolved in boiling water, and the hot solution dropped into cold dilute nitric acid.

SABADILLIC ACID.—A crystalline, fusible, volatile, fatty acid, obtained from the oil extracted by ether from the seeds of *veratrum sabadilla*. The sabadillate of baryta is prepared in the same way as butyrate of baryta is from butter. When this salt is heated with concentrated phosphoric acid, the sabadillic acid sublimes in white needles. It has an odor resembling butyric acid.

PYROTARTARIC ACID.—The composition of this acid is not given. It is very acid to the taste, has a very powerful acid action, and is solid. It is obtained from tartar, is soluble in water, is partly decomposed by heat, and partly sublimed.

SABERIC ACID is obtained from cork, in the form of a white powder and is very slightly acid. It is obtained by the action of nitric acid upon cork; one part of cork and six of nitric acid being used. These are put into a retort to which a receiver is attached and exposed to heat until a yellow wax-looking substance forms on the substance of the fluid; then pouring out the fluid while hot, and stirring the mixture, placed upon a sand bath, until it acquires a thick consistence. When cold, digest it in twice its weight of boiling water, and apply heat until all is dissolved; filter and put it aside, when as the fluid cools, it precipitates a sediment; filter again and evaporate to dryness. The mass thus procured is the suberic acid. It is soluble in thirty-eight parts of water at 140° , and in eighty-six parts at 60° , and very soluble in alcohol. It volatilizes in the form of long needles by heat, and is not acted upon by nitric acid.

ZUMIC ACID.—This acid is obtained from rice and bread and some other vegetable matters which have undergone the

acetous fermentation. It is very acid, does not crystallize, and is colorless.

LAMPIC ACID.—This acid was discovered by Professor Daniel. When the wick of a spirit lamp is surrounded by a spiral coil of platinum wire, and after burning for a short time, and blown out, combustion still goes on, and this peculiar acid product results. It may be more easily collected by placing a small bottomless retort over a heated platinum capsule, and gradually dropping in from time to time a little alcohol or ether. (*Marchand*). It consists of a mixture of acetic, formic, and aldehydic acids in variable proportions. It exales a very irritable, disagreeable vapor, is colorless, does not crystallize, has a very sour taste, and a specific gravity varying from 1000 to 1015. It reddens vegetable blues, and decomposes the alkaline and earthy carbonates, but its most remarkable property is its power to reduce certain metallic solutions. With the bases it forms salts called *lampates*, which may be prepared by saturating the acid with hydrated oxides or carbonates.

IGASURIC ACID.—This acid was discovered by Pelletier in the bean of *St. Ignatius*, or *nux vomica*, and in the *cusparia* bark of the shops, in combination with *strychnia* and *brucia*. It may be obtained by digesting the ground beans, first in ether, and then in boiling alcohol, evaporating the latter decoction to dryness, diffusing the residuum through water, adding a little carbonate of magnesia, again boiling for some minutes, filtering, washing the powder with cold water, again digesting in alcohol, and filtering. The igasurate of magnesia thus obtained is then dissolved in boiling water, the solution decomposed by acetate of lead, and the precipitate, after being washed and diffused through distilled water, is decomposed by sulphuretted hydrogen. The solution thus obtained yields crystals on being evaporated.

ACONITIC ACID.—This acid was discovered by Peschier in the plant *aconetum napellus*. It exists in the juice of the aconite combined with lime. It is prepared by expressing the juice of the plant, previously bruised and sprinkled with water, and filtering, and adding a solution of acetate of lead. Collect the precipitate on a filter, wash it well with cold distilled water, then place it in a glass vessel with pure

water, and pass sulphuretted hydrogen through the vessel until the whole of the lead is thrown down; finish by filtering and evaporating. It tastes sour, dissolves in water, alcohol, and ether, and unites with the alkalis to form soluble aconitrates, and with the metallic oxide, salts that are wholly or nearly insoluble in water. It is a semi-crystalline white mass quite odorless. The *aconitum napellus* is a very poisonous plant, as is also its various preparations, and the utmost caution should be used in experimenting with it. Fatal cases of poisoning have occurred by eating and tasting it.

AMYGDALINIC ACID was discovered quite recently by Liebig. It is prepared by dissolving amygdaline—a product of bitter almonds—in baryta water, and boiling the solution in a glass vessel* as long as ammonia is evolved; then add dilute sulphuric

* The question has been asked us, "how is it possible to boil in a glass bottle, retort, or vessel, when there is so much danger of its breaking?" Glass is capable of sustaining a considerable degree of heat if gently applied and gradually

acid until precipitation ceases, then filter and evaporate the clear liquid in a water bath. This acid is a colorless transparent acidulous mass, deliquescent in damp air, and soluble in water.

ANTHRANILIC ACID ;—First mentioned by Fritzsche, and prepared from indigo. Dissolve indigo in a hot solution of pure potassa, of the specific gravity of 1.35, and add powdered peroxide of manganese until the liquid on dilution and exposure to the air ceases to form indigo blue. It now contains anthranilate of potassa, and free alkali. The alkali must be neutralized with sulphuric acid, and the anthranilate dissolved out with alcohol and decomposed with acetic acid, when orange colored crystals of impure anthranilic acid will be obtained. Purify by uniting it with lime, crystallizing the salt, and decomposing it with acetic acid, when large colorless tubular crystals will be deposited as the solution cools.

increased, and this can be done by means of the spirit lamp, or the sand bath.—Ed. P. A.-J.

PLATE, PAPER OR GLASS ?

From *La Lumiere*.

TRANSLATED FROM THE FRENCH OF N. P. LEREBOURS, BY MRS. A. L. SNELLING.



REQUENTLY, before making any trials in photography, persons have made this inquiry: Plate, paper, or glass? For ourselves, we believe we have replied to two hundred letters, more or less lengthy, the contents of which could have been comprised in two words. The question which has so often been put to us, may be put to others. It is for this reason that we are determined to say something on this subject in *La Lumiere*. All the photographers by profession are subscribers to *La Lumiere*. They know it to be in the hands of a great number of

very experienced amateurs, and of several of our great artists. There are among its readers, many persons of little experience in the art—many beginners, and many who seek to gain some instruction before commencing. It is for these that we write.

Firstly let us speak of *portraits*. Since the presentation of several fine portraits upon paper, we hear observed on all sides, "the reign of the plates is passed, all future proofs will be made upon paper or glass!" We believe if this moment ought ever to come it has not yet arrived, and behold why. We have, among others, admired the fine portraits upon collodion, obtained very rapidly by M. Gray in 1850, and since by two or three persons; and we

should willingly have passed two or three hours in examining those of M. M. Kenne-man and Malone, the skillful photographers of London. But besides these, except in some very rare exceptions, there are few worth speaking of.

Without doubt we see a great number of figures retouched, with an agreeable aspect, but what are they without these corrections? Hardly presentable. Those retouched, unless they have been executed by a skillful hand, can give no value to a mediocre portrait, but it is no longer a photographic proof, it is a work more or less artistical. If, on the one side, we consider how difficult it is in a province, or even in large towns, for those who have, at the same time, taste and talent enough to make their works harmonize with these incomplete proofs, and when we take into consideration also, the still greater difficulties in the preparation of the paper, for all those who have not the least knowledge of chemistry, they will agree with us that the daguerreotype portrait executed upon plates by over twenty thousand photographers can never be replaced by the negative upon paper, or even upon glass. Besides these material difficulties there are perhaps in the physical action, in the manner in which the things fade, a reason that would lead us to prefer, as an object of affection, a portrait upon a plate or upon glass. Firstly, it is the image of a father, a mother, a son, which are themselves reflected upon the sensible plate, without the medium (or intervention) of any material agent, for a simple impalpable vapor produces, or draws it out. On the paper, on the contrary, you obtain at first a negative image, repulsive with ugliness, and by the aid of the stereotype plate, which we reverse upon another sheet of paper, with the accompaniment of chemical operations, we have at last the positive image!

We know very well that many persons find the daguerrean image too like real life, and prefer to this truth a certain naiveté of nature, and expression often false, that they find more poetic—an expression that can be obtained upon the paper, by the aid of a few touches from a skillful painter.

We shall here consider the reasons of this naiveté, and why it is necessary to guard the daguerrean portrait well from being confounded with this *vulgar* taste,

inasmuch as that every figure has its own style of beauty, but it is necessary to know how to discover it. It is for this reason that there are few portrait painters who know how to reproduce the best expression of their model; at the same time there are few photographers capable of discovering it. It is true that with the latter the length of the sitting is a great obstacle to the exhibition of life and expression; then ought we not to wish that the accelerating processes should make new progress, if, however, it is necessary to desire new progress when we have seen the proofs of M. M. Claudet, the Baron Gros, Plumier, Vaillat, and many others, too numerous to mention.

If it is required to produce monuments either generally or in detail, especially by long processes, then without any hesitation we should give the preference to paper. Our conviction in this respect will be shared by all those who have seen the proofs of M. M. Le Gray and Mestral, those of M. Lesecq, the two hundred stereotype plates brought from Egypt by M. Maxime Ducamp.* All these views obtained with our cameras, challenge the most minute inspection, and have a grand artistic effect. The most tasteful dimension for a photographic portrait is the quarter size, and half size. Those photographers who have made the largest portraits have been often the least successful;† therefore they have relinquished them. For views, on the contrary, plates below the normal size seem to have less interest; while plates of 30 or 40 centimètres produce magnificent effects. Even in these dimensions the apparatus of the photographer is trifling if we compare it with that of the daguerreotypist.

Thus the operators who have a higher aim, and have received a mission from government, have not hesitated to give a preference to paper, and they have brought home the chefs-d'œuvres! There are

* This magnificent and precious collection which, by its exactness leaves far behind it the great work on Egypt, will be published by M. Baudry. They comprise all the richest capitals of Sesostris, of Nubia, of Syria, and of Palestine.

† This may be a fact in France, but the argument will not hold good in America, as is abundantly proved by the efforts of many of our first daguerreotypists.—ED. P. A.-J.

many of these views which sell for 15 or 20 francs ! which are a thousand times superior to the designs in sepia tint which were valued at times at 300 and 500 francs ! The *Monumental Italy* of M. F. Piot contains some admirable details obtained by the same process. M. Cousin has also produced some marvellous designs, and M. Blanquart Everard is successful in his Photographic Album. There are many more necessary explanations to be made in order to give an adequate idea of the success of photography upon paper.

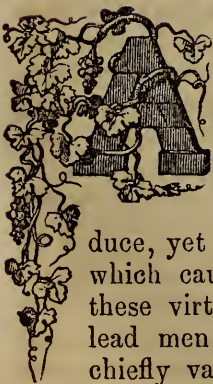
From what is employed in preparing the plates for the portrait and the paper for views, ought we to include in our proscription the glass used for the negative proofs ? We should strangely deceive ourselves. In effect the proofs obtained with these prototypes unite with the fineness of the plate the effects resulting from the negatives upon paper. They have sometimes a little dryness, they can be more cold, or less artistical, but these defects which only exist in certain classes, are redeemed by the qualities we shall mention. Then, we may ask, why not prefer this process to all others ? Why, for this reason, first, for traveling the glass is much too fragile ; but this is not all. Of all the photogra-

phic methods this presents the most difficulties. M. Niépce de Saint Victor has obtained by this process what he considers very remarkable results ; M. M. Bayard and Ferrier have produced with great success the most interesting monuments of Paris. Then every photographer is acquainted with the productions of M. Martens. Why is it that these gentlemen are the only ones in Paris with whose works we are acquainted ? M. Martens, the skillful operator, has had many pupils under his charge, but not one has equalled the master. It is that numerous difficulties are found in the application of the coating of albumen, an operation which is analagous with that which in engraving consists in making the grains ; now M. Martens possessed such skill in this operation, that his colleagues often had recourse to him.

From the preceding, does it then follow that it will be necessary to renounce making photographs upon glass ? Yes, we say, for the greatest number. But to all those who are adroit with their hands, who feel the sacred fire kindling within them, and possess an indefatigable perseverance, we say, "work on, and you will be abundantly recompensed."

THE VALUE OF KNOWLEDGE.

BY THE REV. W. H. FURNESS, D. D.



ALTHOUGH no moral worth can justly be attributed to the man who is honest, industrious, and temperate, merely for the sake of the honor and thrift to which these qualities conduce, yet modes of thinking prevail, which cause the intrinsic value of these virtues to be overlooked, and lead men to account them solely or chiefly valuable as means, means to the attainment of some one of the authorized objects of pursuit, ease, wealth,

or place. Unquestionably they are the best qualifications for success in life. Still it greatly derogates from their essential worth, to regard them only as means to something better ; as if anything the world has to give could be better than virtue itself. It is at once the most solid wealth, and the highest dignity. It is to be estimated, not only, nor principally as a means of worldly well-being, but as an end, as life's noblest end. And he has the true way of thinking, who, instead of being industrious and temperate that he may be rich, is ambitious of being rich that he may

have a larger sphere of activity, and a better opportunity of self-control. As it is important that men should know that personal virtue, is the great means of happiness, so is it certainly not less important that we should see, far more clearly than we commonly do, that happiness, or rather the possession of those things in which happiness is generally considered to consist, should be a means of virtue, of personal improvement, and should be sought on this account, and for the sake of this good end.

As it is in the moral concerns of life, so is it in relation to intellectual pursuits, the acquisition of knowledge. In order to demonstrate the value of knowledge, it might seem to most persons to be enough simply to enumerate its practical benefits, to show its utility, how it contributes to the daily purposes of life, and confers power, power over inanimate nature, power over men, putting the sceptre of the physical universe in our grasp, and pouring its treasures at our feet.

But even were we able to specify all the uses of knowledge, the half would not be told. After all, there would remain for the love and pursuit of knowledge, a reason above all these reasons; namely, in knowledge itself. When Henry More, the old platonising divine, was asked why he studied so hard, he replied, "That I may know." When he was asked again, why he wanted to know, again he made answer, "That I may know." Apparently he gave no reason for his intellectual toil; but, in fact, he gave the very best reason. For, there is an absolute worth in knowledge which cannot be computed. It is the natural and necessary food of the mind, the nutriment of our intellectual being. It is in us an ineradicable instinct, to crave knowledge as we crave daily bread. A striking analogy presents itself here between the body and the mind. As the former requires food, so does the mind hunger to know. And this intellectual appetite is felt before we can possibly have any experience of the benefits of knowledge.

This simple fact, by the way, that we desire knowledge before we have the least idea of its advantages, claims particular attention; because it furnishes a decisive argument against that false philosophy, which has unhappily become the practical, un-

written philosophy of the present day, and which maintains that selfish calculation is the grand spring and wheel of all human activity, that, in all that a man does, whether it be good or evil, he has always an eye to his own pleasure or profit, and that the purest virtue is only a disguised self-seeking. Against this doctrine, so painfully repugnant to every generous sentiment, Nature herself does most emphatically testify. Here is the natural desire of knowledge, for instance, one of the primal facts in the constitution of man. It is the instinctive yearning of the mind towards something out of itself. It is obviously originated by no calculations of self-interest. For it springs up within us antecedently to any perception on our part of the uses of knowledge. Even the common bodily appetite for food is not, in the first instance, nor ever, while the body is in health, the offspring of calculation. The infant when it first hungers for nourishment, does not know whether the food it craves will nourish or destroy. Nor can you excite hunger in a sick man by discoursing ever so eloquently upon "the ordinance and institution of eating." But, without discussing the point any farther, we recommend to such of our readers as may wish to know the truth in regard to the possibility of disinterestedness, the writings of one of the profoundest of modern thinkers, Bishop Butler. To his Eleventh Discourse, which is an admirable exposition of the principles of human action. Sir James Mackintosh, in his "View of the Progress of Ethical Philosophy," points as to the dawn of sound philosophy in these later times.

To return;—there is in man a natural desire of knowledge. It does not look beyond knowledge to any benefit which is to accrue therefrom, but it rests in knowledge as its end. It is not confined within any assignable sphere. It is not limited to things that are at hand. To the remotest objects in time and space it turns with an interest even more intense than is awakened by what is near. Let the light of knowledge fill never so large a circle, still the mind pants, by the instinct of its nature, to penetrate the dark beyond. Would you be made conscious of this fact of your nature? Cast one look at the grand dome overhead, and those still fires, hanging so mysteriously there, will instantly provoke "the sacred

hunger" of the mind. The aspect of the heavens displays, as in some boundless hall, the natural food of the mind, and nature invites us to enter there, and subsist as in our rightful dwelling. All things challenge our curiosity. They summon us to enquire and know. How great the faculty by which a relationship, closer than that of flesh and blood, is revealed between the mind of man and the immeasurable universe. It connects him with immensity and Eternity; for there are no depths of time or space into which it does not urge him to plunge. It is a badge of his present dignity, a prophecy of his destination. Consider any individual, no matter how obscure or how he may be bent and scarred by labor, consider how there is folded up within him a power by which he is related, not only to what he sees and knows, but to what is unseen and unknown; binding him as by a visible tie, to all existence. His being, thus regarded, dilates beyond the scope of imagination. We contemplate a mighty nature, of which the visible shape is but a dim and vanishing symbol. One of the most pitiable objects on earth is a human being, in whom stirs no curiosity, no desire of knowledge. Captain Cook tells us, that as he approached one of the islands of the Southern Ocean, a solitary savage was descried, fishing from a canoe. As the vessel of the European drew near, and sought communication with him, he evinced not the slightest astonishment. There was no reason to suppose that he had ever witnessed such a sight before, or that he was bound, as some barbarians are, by his ideas of dignity to express no surprise. His indifference is represented as pure stupidity. Such a condition of human nature seems so abject, that one is almost inclined to think that it must have been a spectral illusion, floating there on the wave and not a real man with the complete faculties of a man. When, in other instances, the same illustrious navigator tells us of the ardent curiosity of the new tribes that he visited; this one fact redeems the picture of savage desolation, and is a compensation for all the want and ignorance with which it is associated.

The mere act of knowing, the simple perception of truth satisfies and delights us. It sometimes seems to be thought that the pursuit of knowledge is painful

and laborious, and that there would be no inducement to it, were it not for the practical purposes to which the intellectual stores we may gather admit of being put. And there is a disposition to undervalue all intellectual pursuits that are not productive of some direct tangible benefit and to discourage all labor of this sort, upon which there is not the fullest insurance in dollars and cents. We have no intention of advocating, in opposition to this tendency, the false notion of the wise men of antiquity, who held it derogatory to the dignity of science and philosophy to apply them to what they pronounced the mean and material interests of every-day life. But we do affirm that the jealous regard, anciently cherished for the honor of science, this uncompromising recognition of its intrinsic excellence gave a freedom and nobleness to scientific labors, of which they are in danger of being wholly destitute in these modern days, when the mind, with all its wondrous, God-inspired faculties, is wont to be treated as a mere mechanical contrivance to promote the purposes of our social and domestic economy. At all events, into whatever errors ancient wisdom was betrayed by its religious reverence for the intrinsic nobleness of knowledge, we are liable to errors fully as injurious, from our unsleeping avidity to secure its marketable advantages. We have well-nigh forgotten that it has a value in itself, and are ready to defy all studies as barren and worthless that do not serve the common objects of life. We repeat, therefore, the bare vision of truth, of things as they are, produces, or rather it is, an indefinable satisfaction. For the truth of this proposition, we appeal to no poetry—to any of the fine arts, but to those sciences, which, while they are the richest in the applications, of which they admit, to useful purposes, are deemed the most homely and uninviting in themselves. We shall not rely for illustrations of the intrinsic delights of knowledge, upon such questionable cases as that of Dr. Busby, whose enthusiasm for the classics was so great, that he is said to have died of bad latin. But we refer the reader to the mathematical sciences—to Geometry. In no department of knowledge is such an unmixed pleasure taken in the simple contemplation of truth as in these. No rhetorical art, no figures of

speech have had such potent charms as the crabbed figures of arithmetic. It would be a strange sight now-a-days, to see a venerable mathematician, such as our Bowditch was, break forth, like him of old, who, when the solution of a problem that had long defied his sagacity, flashed upon him, rushed out into the street, shouting at the top of his voice, "I have found it! I have found it!" And yet, every one who has given particular attention to studies of this sort, sympathizes with the enthusiasm that prompted to such an outbreak, and knows by personal experience, the pleasure produced by the simple perception of mathematical truth. What a striking illustration of the intrinsic beauty of knowledge is given in the notices of Archimedes! So engrossing was the devotion to his darling science, that he forgot to eat and drink and pay common attention to his person; and when they dragged him to the bath, he occupied himself with drawing diagrams in the ashes, or on the ointment which was put upon his body. He held it to be trifling with the pure truths which he studied, even to apply them to the construction of engines for the defence of the city where he dwelt, against the formidable army of Rome. And when he had put them to use in this way with such success that, if but the end of a bare pole appeared above the walls, the besiegers were smitten with the dread of some new machinery to be turned against them, still the power and the renown thus acquired, seemed to him but as the baubles of a child, in comparison with the delicious pleasures of Geometry. Amidst the uproar of the siege, he fled to his beloved pursuit; and when the city was taken, he was found lost in study. The law of self-defence, which, we are assured, is the first law of nature, was to him no law at all. He forgot that he had a life to defend, and resented the entrance of the soldier who rushed in upon him with a drawn sword, not as a peril to his person, but as a very impertinent intrusion on his studies, and begged him to wait until the demonstration was finished, and then he would attend to him.

The peremptory demand of our times that knowledge shall be immediately available to some profitable purpose, has the effect, not only to cut off every branch of knowledge as worthless, which does not

give immediate promise of fruit, (as classical learning for instance,) but it tends to chill the genial glow of our native curiosity. It cools the ardor of intellectual activity. Already has this economical disposition stood in the way of the greatest enquirers. The invaluable labors of Gallileo were ridiculed as useless, and, by insisting that knowledge must be lucrative, point was given to the text of the itinerant friar, who, wretchedly punning upon the name of Gallileo, preached against him from the words "Ye men of *Galilee*, why stand ye gazing up into Heaven?" Must it not quench the poet's inspiration to be perpetually reminded by the whole spirit of the age that he must prove the use of his beauteous creations? "Of what conceivable use," many cry, "is a man's learning, if it brings him in no money?" Happily for us, the great inventors and discoverers, the philosophers and poets never reasoned thus. They recognized the absolute as well as the relative value of truth; and for its own dear sake they toiled. There were no price-currents, in the days of Homer and Milton. And had there been such things then, think you, those great men would have looked into them to see whether epic poems were in demand, before they set to work to produce the *Iliad* and the *Paradise Lost*? Or was Walter Scott prevented from writing those brilliant romances by the knowledge that novels had long been a drug?

By watching all so anxiously for the practical results of knowledge, we are sure to defeat ourselves, and lose the very advantages we are so eager to secure. Here is a weighty reason why we should insist upon the intrinsic worth of knowledge. If it is to be turned to a useful account, it must be first and principally loved and sought for itself. That is a comprehensive saying of Bacon's, familiar to us all, that if we would command Nature, we must first implicitly obey her. The same may be said of knowledge. If we would have knowledge to be our faithful servant, we must learn to woo her as a bride. Or, in plainer phrase, it must be sought as an end, if it is to be effectual as a means. It is easy enough to cultivate some one faculty of the mind, the memory, for instance, and accumulate an immense store of facts, which, instead of proving a coat of mail to

the understanding, shall only weaken and overpower it. It is common to speak of what is committed to memory, as so much got by heart. So the phrase runs. It is singularly false. For what is usually committed to memory, however trippingly it comes from the tongue, very seldom has a deeper origin, and has very little to do with the heart. But if it is knowledge that we want, knowledge that shall fit us to meet the various and untried occasions of life, and make us stronger for what we know, real, living knowledge, it must be worked up with the very life of our being. As the Mexicans, when they first saw a horseman, mistook the appearance for one animal, so our knowledge, if it is to serve our purposes, must not only seem, but be, one with us. And to acquire such knowledge, we must pursue it for its own sake, and seek it as hidden treasure. If we are for ever computing its profits, looking over and beyond what we have in hand to do, to the distinction we are to acquire, or the money to be made, or the good even which is to result to others, our attention will certainly be distracted, and we shall lack that hearty concentration of our strength, which alone will enable us to grapple with a subject, and "tear out the very heart of it."

It is interesting to remark, in this connexion, how continually we defraud ourselves, of all true pleasure and profit, by looking all too anxiously for the effect to be produced on us, by any great work of Nature or Art. Hence it happens that any new and wonderful sight, whose beauty has been loudly and generally published, seldom produces its full effect at first, because men look for the effect, and not at the thing itself. Hardly an individual returns from visiting Niagara, who does not confess to a feeling of disappointment when that miracle first opened upon his view. The reason is obvious. Men visit that world renowned spot, thinking, not of what they are going to see, but of what they are going to feel, not of the Falls, but of themselves. With the attention thus distracted, they fail of receiving a full impression of the wonder. Were any one, of a bright moonlight night, to be suddenly transported in his sleep to Niagara, there can be little doubt, that, when, startled from his slumbers, by the great voice of the waters, he should behold the stupendous spectacle,

he would be overwhelmed by the sublime vision, and, after sleeping through the remainder of the night, if indeed he could sleep again that night, without some potent drug, what a glorious dream would he have to tell in the morning! So it is with the acquisition of knowledge. In whatever department a man labors, be it History, Science, the Fine Arts, or Philosophy, he will be certain to miss the delights of knowledge, if he does not lose himself in his peculiar pursuit. He must give up his heart to it without reserve or stipulation. Undoubtedly there are numbers who are impelled to the pursuit of knowledge, not by a pure love of knowledge, but for the sake of her dower, for the distinction they will obtain. But precisely to the extent to which their vision has been double, and not single, and they have looked to fame, and not to science, they have failed of both; and never has the intellectual laborer so truly deserved renown and so richly won it, as when, in the enthusiasm of his pursuits, he has forgotten both the praise, and the very existence of the world. Such an one, is ever ready to confess that no wealth nor honors can for an instant compare with the bare perception of a great truth. "Take, take away," once exclaimed one of these men, "the gaudy triumphs of the world, the long, deathless shout of fame, and give me back that uneasy rapture, when truth first burst upon the startled sight."

Of all the labor ever done under the sun, that of the Alchemists was the most worthless. And for a plain reason; they were actuated not by a generous thirst for knowledge, but by motives confessedly selfish, the love of life, and the accursed thirst for gold. They explored nature not for truth, but for the *Elixir of Life* and the *Philosopher's Stone*, with the one to turn all things into gold, and to prolong this mortal existence indefinitely with the other. As they were impelled by these sordid principles, their toil, than which none was ever more indefatigable, came to nothing. Occasionally indeed, their high nature proved too strong for them; and losing sight of their selfish objects they had their curiosity awakened by the mysterious relations and affinities of matter, incidentally disclosed in the course of their investigations. Thus they rendered incidental service to the invaluable science of Chemistry;

and so their pursuits were rescued from unqualified contempt.

How important it is to the very utility of knowledge that we should recognise its essential worth, and, whatever other advantages it may bring, account the simple possession of it our chief pleasure, is shown in the case of many of those who have been most distinguished for their intellectual successes. How often has it happened that they who have made the greatest advances in science, and laid the world under the greatest obligations, have died in extreme poverty, while others were making fortunes out of their inventions. From such cases it would seem that a single eye to knowledge is incompatible with the existence in the same individual of those provident qualities which enable a man to clutch the main chance at a good living. Science is very jealous of the affection of her votaries, and he who would win her triumphs must give her his whole heart. We mourn over the fate of those, who, while they have made splendid discoveries, have lived in want; as if they had received no reward. But if they had known that they could not have both wisdom and wealth, and had been permitted to choose, would they have hesitated a single instant? They would immediately have cried, "Let obscurity come, and incessant labor, and the extremest poverty, but give us knowledge, no matter at what cost of personal comfort; we shall account ourselves only too favored."

And here we are reminded of a passage in that admirable Essay of Mrs. Barbauld's "Upon the Inconsistency of our Expectations." It should be written upon every young man's heart. "Is knowledge," asks this writer, "the pearl of great price? That too may be purchased by steady application, and long solitary hours of study and reflection. Bestow these and you shall be wise. 'But,' says the man of letters, 'what a hardship it is that many an illiterate fellow, who cannot construe the motto of the arms on his coach, shall raise a fortune and make a figure, while I have little more than the common conveniences of life.' Was it then in order to raise a fortune that you consumed the sprightly hours of youth in study and retirement? Was it to be rich that you grew pale over the midnight lamp and distilled the sweet-

ness from the Greek and Roman spring? You have then mistaken your path, and ill employed your industry. 'What reward have I then for all my labors?' What reward? A large comprehensive soul, well cleansed from vulgar fears and perturbations and prejudices; able to comprehend and interpret the works of man—of God. A rich, flourishing, cultivated mind, pregnant with inexhaustible stores of entertainment and reflection. A perpetual spring of fresh ideas, and the conscious dignity of superior intelligence. Good Heaven! and what reward can you ask besides?" Even in the humblest occupations, however the desire of gain, and the ambition of rising in the world may tend to stimulate men's energies and insure their elevation, he is, after all in the end, the most successful artisan, as he certainly is the happiest man, who seeks not money nor distinction chiefly but perfection in his art, and is bent, not only upon knowing the true principles of his trade, but also upon realizing his knowledge in the product of his labor.

From what we have said it follows that the one thing most desirable to possess is not amount of information, however large, but an ardent thirst for knowledge. Not he that knows much is the true lover of knowledge, but he, who, whether he knows much or little, is eager to know more, in whom the desire of knowledge burns an unquenchable flame. "A little knowledge is a dangerous thing." If this saying be taken without a very essential qualification, then is all knowledge dangerous. For the amount of all human knowledge is very little in comparison with the actual sum of truth. But it is not the little knowledge that is dangerous, but the knowledge, whether little or great, that is accounted by its possessor enough, and which he makes no effort and has no desire to increase. By this estimation of it, he shows that he holds it, not in the love of it, but for his vanity or ambition. The true sign of intellectual life is not the quantity of information one has acquired, nor the abundance of the appliances of learning which he has collected in the shape of books and libraries, but a steadily increasing desire of knowledge. The poor man, who has to show, as his sole literary wealth, only an odd volume, well thumbed, of some standard work, nay, the "swart artisan," who has not even a

book, but who, while he is toiling amidst smoke and fire at the anvil or the forge, is greedy to know the properties of iron, is more truly an educated man than he who sits in the pride of learning amidst whole shelves of folios. The love of knowledge is the one thing essential. This point is well illustrated in the "Contributions of Q. Q." by two soliloquies, the one of a young lady just from school, who is supposed, as the term is, to have finished her education, and who, wonderful creature! has nothing more to learn. She enumerates with great satisfaction the *ologies* she has gone through, and truly the amount is no trifle. But on the next page a philosopher is introduced, one who has descended into the depths of knowledge and brought back as his deepest conviction, a sense of his own ignorance.

From what has been said it follows that the common excuse given by men engaged in the active pursuits of life for the entire neglect of intellectual culture is quite beside the mark. "Why," they ask, "why should we submit to such hard labor, and read and study? Of what earthly use is it to us? It does very well for those whose profession is learning in one form or another, but it is no concern of ours." Let it be that, commercially speaking, the pursuit of knowledge is of no use to the man of business, that it will not help the sale of a single bale of goods, but rather, through the diversion of mind it may occasion, a lucrative transaction now and then to miscarry, still it is a fact, that is not to be ignored, that in every man, whatever may be his walk in life, active or retired, there burns, more or less brightly, the divine fire of mind. Every man has that in him which no mechanical routine will satisfy, which demands knowledge as its natural sustenance, and the absolute condition of its growth. If there were men who have nothing to do with the acquisition of knowledge, one cannot but think that there would be a difference between their whole structure, and that of the wise and educated, a difference, that is not at all discoverable now upon the closest inspection. If the man of business has no use for a mind, he would have been made very differently. As one is sometimes said to be born with a silver spoon in his mouth, the business man would have come into life

with a pen behind his ear, and with an instinctive faculty for the calculation of interest, simple and compound. But there is no such wide difference as this among men. Noble words and the history of noble deeds cause all men to thrill and glow, and every man sympathizes with his fellow-men in the progress of knowledge, and in the discoveries of science. In every soul of us there is a hunger to know, which is feeble only when it is neglected. For the sake of this precious part of us, knowledge is to be sought, be our occupations what they may. The mind has wants far more vital than those of the body. The reader has read in his childhood of the Prince in the Eastern story, who, by some magical charm, was turned one-half of him into marble, so that while one side was living flesh, the other was cold immovable stone. How much more deplorable the condition of him, whose mind, which is infinitely more to him than his body, is sunk in the stone-like stupor of ignorance, and who has it to remember that it is so by his own will. When will that blessed day dawn, when the higher nature of man, with its boundless aspirations, its immortal hunger will be duly revered and cared for?

But there is no man, no young man certainly, who, having the opportunity of mental culture, has come to the deliberate determination to relinquish entirely all hope of intellectual culture. Multitudes please themselves with the idea of retiring by and by, and exchanging the irksome shop or counting-room for a quiet library and literary recreations. What grown up man can be beguiled by such a delusion? Have we not seen the folly of it over and over again in real life? Dr. Johnson mentions the case of a tallow-chandler, who, having amassed a considerable fortune, retired, making over his business to his foreman, with the delightful prospect of literary ease. It does not appear that he was a niggardly man, and had any objection, generated by his old trade, to the consumption of the midnight taper. But certain it is, that he gave no encouragement to his old employment by any studies of his, pushed far into the night, for he grew weary, and was soon seen hovering round the old shop, until at last he went in, and begged as a particular favor that they would let him know their *melting* days, and he would come and help

them. Thus, fitted by no preparation for the retirement which he had been looking forward to for years, he was forced to fly for relief to the most disgusting part of his old business. When we hear men promising themselves a refined literary leisure hereafter, while the common cares of life are twisting their roots in with the whole texture of their minds, and binding every faculty round and round, we are reminded of the old lady who was observed to attend daily upon the drawing of a lottery. One of the clerks, noting her constant attendance, asked her for the number of her ticket: "My dear child," she exclaimed, "I have not got any ticket. But, if it please Heaven that I should draw a prize, I can draw a prize whether I have a ticket or not." Is the absurdity in this case one whit greater than that of him who thinks to enjoy the delights of knowledge without that intellectual preparation essential in the very nature of things? Is not he, too,

looking for a prize for which he has purchased no ticket?

It is necessary to the efficacy of all labor that it be spontaneous. No work is well done, whether in the workshop, the school, or the study, that is not done, as the sailors say, "with a will." And yet, we know not how it is, the very best way of inducing hearty and victorious exertion is to put oneself under the iron necessity of exertion. This is the way to awaken the energy of a slumbering will. Let him, therefore, who is resolved to vindicate the claims, and feed the appetite, of his mind, bind himself irrevocably to the task. A task it may be for a long while, but the time will come when it will be his privilege and pleasure, and he will be ready to declare with Fenelon that if the riches of the Indies were poured at his feet, he would not exchange for them his *love of reading*.—*Sartain's Magazine*.

PHOTOGRAPHY AND ITS PATENTS.



IN the *Art-Journal* for April we directed the attention of our readers to attempts which were then making towards the formation of a Photographic Society. To such a society, from its important bearing upon Art, we desired to give our earnest advocacy. It is, therefore, with much regret that we find the promoters of the society compelled, at least for the present, to abandon their designs, owing to the impossibility of proceeding in any satisfactory way while shackled with restrictions by the patentee of the calotype process. The gentleman who met Mr. Fox Talbot on the question of preliminary arrangement, agreed to submit a certain form of agreement and a set of rules, which were drawn up by Mr. Talbot, but materially modified during the discussion of the subject, to the considera-

tion of the most eminent photographic amateurs of the metropolis. This agreement and these rules were to the effect that Mr. Fox Talbot should give a license to every member of the society, to practice any of his patented processes for their amusement; the society agreeing to the exclusion of every member who should sell on his own account a photograph, who should employ the art as an auxiliary agent for engraving or lithographing any object, or who should buy a photograph either of foreign or English production from any one who was not a licensed agent of the patentee. It was felt by nearly every one to whom these propositions were submitted that it was impossible to agree to them, since the patentee insists upon claiming every form of photographic process, howsoever unlike his own. The advance of the Art would necessarily be further checked by such a society than it is already under the ill-understood operation of the

patent laws. It was felt that every amateur in accepting such an agreement as that proposed by Mr. Fox Talbot, virtually admitted the patentee's right to prevent the amateur from using his processes, even where there was not the remotest intention of employing them for profit; and this is against the maxim of the English law as it at present stands; although it appears there may still be raised a question upon this, demanding the decision of a jury. The want of that liberal spirit which should ever actuate the philosopher was so strongly displayed, that the patentee's form of agreement was at once rejected, and thus, for the present, the society has fallen to the ground. It will be revived again we hope, and we believe we cannot better serve the friends of photography than by stating in a succinct manner the progress of discovery in the art giving *the date of publication*, which must, of course, clearly define the question of the equity of the patentee's claims.

In 1839 Daguerre announced the discovery of a process by which he was enabled to produce permanent pictures upon metallic tablets by the agency of the solar rays. The agent employed to produce the sensitive surface was *iodine*. This, however, was not the discovery of Daguerre, since in 1829 Niepce stated that "*the fumes of phosphorous and sulphur acted in the same way as iodine*" in producing "*extreme sensibility to light*."

The announcement of Daguerre's discovery induced Mr. Fox Talbot to publish immediately certain results which he had obtained with the chloride of silver; these will be found in the Philosophical Magazine for March, 1839. In this communication Mr. Fox Talbot gives every instruction for the production of *negative* and *positive* images; in fact, details all that is necessary for the process of *printing from the negative image on paper*. On the 14th March, 1839, Sir John Herschel made his first communication to the Royal Society on the subject of photography, and then published "*The Use of the Liquid Hyposulphites for Fixing the Photographic impression*." On February 20, 1840, the same eminent philosopher made his second communication, in which, amidst many novel processes he mentions, first,

the use of *hydriodate of potash* for bleaching a dark surface, and thus forming an iodide of silver: he says, "*A positive paper of this nature is actually prepared for sale by Mr. Robert Hunt, of Devonport, specimens of which he has been so obliging as to send me, and which certainly give results of great promise in this line,*" and secondly the use of *iodide of silver*. "*I find,*" he says "*that glass so coated with iodide of silver is much more sensitive than if similarly covered with the chloride.*"

At a meeting of the British Association at Plymouth in 1841, Mr. Robert Hunt communicated a very sensitive Photographic process in which the ferrocyanate of potash was employed on *iodized paper*. As this is important, we copy a portion of Mr. Hunt's communication from the Report of the British Association for that year, which clearly gives to every one the right of preparing iodized paper after his method. "*Highly glazed letter-paper is washed over with a solution of one drachm of nitrate of silver to an ounce of distilled water; it is quickly dried, and a second time washed with the same solution. It is then, when dry, placed for a minute in a solution of two drachms of the hydriodate of potash in six ounces of water, placed on a smooth board, gently washed by allowing some water to flow over it, and dried in the dark at common temperatures.*" In what essentiality Mr. Fox Talbot's iodized paper patented in 1842 differs from this, we cannot discover. We leave the question of the propriety of patenting the inventions of other experimentalists to be settled by the patentee.

Again, in Sir John Herschel's paper, already quoted, we find the following words: "*I was induced to try in the first instance a variety of mixtures of such organic soluble compounds as would not precipitate that salt (nitrate of silver). Failing in any marked success in this line (with that somewhat problematic exception of the gallic acid and its compounds), the next idea,*" &c; and again, after speaking of fixing the pictures obtained on iodide and bromide of silver, Sir John Herschel says they "*may be finally fixed with hyposulphite of soda, which must be applied hot.*"

We will now turn to Mr. Fox Talbot's

patent of 1842. The specification of this gives—first, nitrate of silver, secondly, iodide of potassium washed over the best writing-paper, and then with clean water—this he calls “*iodized paper, because it has an uniform pale yellow coating of iodide of silver.*” We know nothing of the patent laws if they allow any individual thus completely to seize upon the invention of another and make it his own. The use of gallic acid combined with nitrate of silver is clearly the result of Mr. Talbot’s investigations, and to the very beautiful effects obtained by this—the calotype process—no one is disposed to deny his fair claim; and we are convinced that he would not upon any consideration be disposed to push his claims as a patentee further than this. In the second patent “*hot hyposulphite of soda*” is claimed, but this we have seen belongs to Sir John Herschel.

In May, 1844, Mr. Cundell published in the Philosophical Magazine a full development of the calotype process as improved by himself, and from this period we must date the advance of the art in this particular direction. On all sides amateurs commenced operations, and the calotype became in every respect superior to what it was when Mr. Talbot specified. On the continent, and at home, various improvements were introduced in the paper processes, and the use of albumen on glass gave a new feature to the art. Eventually, when the use of albumenized glass and paper had fully developed itself, Mr. Talbot, in conjunction with Mr. Malone, used porcelain plates, since glass ones could not be sustained, and the conversion of a negative into a positive image on glass or any other material became the subject of a patent. In this, however, they had been long anticipated—Sir John Herschel, in 1840, writing of a picture on glass, says, “*after drying, it was restored, and assumed much the air of a Daguerreotype when laid on a black ground*, and still more so when smoked at the back—the silver portions reflecting most light, so that its character had in fact *changed from negative to positive*”—and again, Messrs. Ross and Thompson in 1820 exhibited to the British Association at Edinburgh positive images on glass plates.

At York, in 1844, Mr. Robert Hunt published the important use of the pro-

tosulphate of iron as a developing agent, and at the same time Dr. Woods published his catalysotype process, involving the use of the *iodide of iron*. In Mr. Talbot’s last and most sensitive process we find these two salts, the *protosulphate of iron* and the *iodide of iron*, combined to produce the sensibility: this process is also the subject of another patent.

We have endeavored to show with every correctness the condition of Photography in relation to the several patents by which it is clogged. We admit Mr. Fox Talbot’s claim as a discoverer of the first processes with the chloride of silver—which, as we have stated, he, then guiltless of patents, gave to the world with the true spirit of a philosophic inquirer. We fully acknowledge the validity of the patentee’s claim to pictures produced upon iodized paper washed with gallo-nitrate of silver, but that every improvement is to be crushed because one man has a patent, is a case too monstrous for even the worst form of patent laws to contemplate. We have heard it questioned whether or not the collodion process was free from patent restrictions. We cannot conceive how it can by any possibility be involved, but let us examine the conditions.

The collodion process consists of the etherial solution of gun cotton, in which some iodine is dissolved, spread upon glass, and over this film is deposited iodide of silver, when the glass plate is dipped in a solution of nitrate of silver. The collodion is an absolutely new agent, and although iodide of silver is used in the calotype process, it must never be forgotten that iodide of silver was employed as a photographic agent long previously to the date of that patent. The picture is developed by the use of the protosulphate of iron, or the protonitrate, and many of the more active de-oxidizing agents may without doubt be employed. The photograph is fixed with hyposulphite of soda, and from this *negative* image the *positive* ones are copied by the ordinary process of super-position. The negative picture may however be converted into a positive one by backing it up with any black substance or smoking the glass as recommended by Sir J. Herschel. Referring to the conversion of the negative calotype into a positive one, let us examine what Mr. Malone did in this direc-

tion. An albumenized plate is iodized by exposure to iodine vapor, and then rendered sensitive by being dipped in a solution of nitrate of silver. When removed from the camera, "we pour over it a saturated solution of gallic acid. A negative Talbotype image is the result. At this point previous experimentalists have stopped: we have gone further, and find that by pouring upon the surface of the reddish-brown negative image during its development a strong solution of nitrate of silver, a remarkable effect is produced. The brown image deepens in intensity until it becomes black. Another change commences—the image begins to grow lighter; and finally, by perfectly natural magic, black is converted into white, presenting the curious phenomenon of the change of a Talbotype *negative* into apparently a *positive* Daguerreotype, the positive still retaining its negative properties when viewed by transmitted light." In Mr. Archer's process this result is obtained by pouring a solution of corrosive sublimate over the plate; and it has been shown by Mr. Fry that the combined action of pyrogallie acid and protonitrate of iron gives rise to the same result. The most perfect *silvering* is however obtained by Dr. Diamond's mode of manipulation; which is as follows—

The picture is taken as in the ordinary collodion process, and then developed by protonitrate of iron. This salt being thus prepared, 600 grains of the protosulphate of iron are dissolved in one ounce of water, and the same quantity of the nitrate or barytes in six ounces of water; these being mixed together, protonitrate of iron and sulphate of barytes is formed by double decomposition. The negative image being developed, a mixture of pyrogallie acid and hyposulphite of soda, which has undergone partial decomposition, is poured over the plate, which is gently warmed. Upon this the darkened parts are rendered brilliantly white by the formation of metallic silver. This picture being backed up with black velvet, assumes the air of a fine Daguerreotype without any of the disadvantages arising from the reflection of light from the polished silver surface.

Our readers will now be able to judge of the merits of the different experimentalists to whom Photography is indebted for

its several improvements—we leave these to speak for themselves. Upon reviewing however, the various specifications of the patentee, and the dates of them, we cannot but be struck with some points which require comment.

To the calotype process, as such, the claim of the patentee is undoubted. He or any other man making a discovery, has a positive right to patent that discovery if he pleases—he has to specify the means by which he produces certain results; but he cannot patent every method by which the same result may be obtained. We learn that the patentee holds a contrary opinion—but he is mistaken. No more can he claim every method of developing a dormant image, than an engineer claim every method of raising water in which the stream is employed. It is a maxim in the English patent laws that no principle can be patented, but only such special applications as may have been the result of the patentee's invention. The calotype process however is developed; it is not very successfully employed for some time; eventually, many very great improvements are effected; new agents are introduced; and then the patentee says, these you shall not employ without my permission. Beyond this, albumen is introduced, and glass plates employed with advantage; when suddenly we are surprised by another patent involving albumen, and eventually another, the sensibility of which is entirely dependent upon the use of two salts of iron, the value of which as photographic agents, was the discovery of two gentlemen who had freely given the results of their investigations to the world. This is surely not just towards those to whom the first suggestions are due; and it is still less so towards the public, whose property these thoughts or improvements had become upon publication.

None can desire more earnestly than ourselves to see high rewards given to those men who advance either Art or Manufacture by their scientific researches. It is quite unworthy of our advanced stage of civilization, that an inventor is driven to the enormous cost of a patent to secure his right to his improvement or discovery. And it is lamentable to perceive how completely one man may include in his specifications—and claim as his own—those im-

provements or discoveries which belong to others. It may be said, every man has his remedy at law; but there are not many who are disposed to court the ruin which too frequently follows in the train of the remedy. Thus it is that improvement is checked in the beautiful art of photography. We know of several amateurs who refrain from publishing their processes, lest they should be caught up and included in some new patent. If the art were free, it is now rendered evident, most surprising advances would be made.

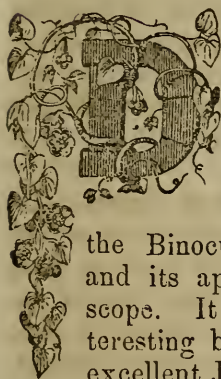
Let us hope that the recent failure of the attempt to form a Photographic Society may be productive of much good. The patentee must have become aware of the unkindly feeling with which his proceedings are viewed. If the society was formed free from all restrictive hindrances, there can be no doubt that the advances of pho-

tography would be rapid; and from the expressions of all parties we gather the fact that such a society would confer its highest honors upon their countryman to whom they are indebted for the earliest publication of the means of permanently fixing sun-drawn pictures.

[Since the above has been at press, we have learned with very much satisfaction, that the patentee has been induced to make a proposition which may probably lead to the entire removal of all patent restrictions from photography. We trust that the intention may be fully carried out—that we shall yet see the art advancing in all its practical applications, and that, by an act of liberality, Mr. Fox Talbot may change every hostile feeling into a general expression of pleasure, and a realization of merited honors.]—*Art-Journal*.

BINOCULAR PERSPECTIVE.

TO THE EDITOR OF THE ART-JOURNAL.



EAR SIR, the following letter on a topic strictly connected with the Fine Arts, is addressed to Professor Wheatstone, partly for the purpose of marking the distinction between the Binocular Vision to Painting, and its application to the Stereoscope. It may not be deemed uninteresting by many readers of your excellent Journal.

Your obedient servant,
JAMES HALL.

ATHENÆUM CLUB, PALL MALL,
20th January, 1852.

DEAR PROFESSOR WHEATSTONE,—Taking advantage of the memorandum you were kind enough to hand me a few weeks ago, I have read with peculiar interest your paper of 1838 on some of the phenomena of Binocular Vision; and likewise

the papers of Sir David Brewster and others to which you referred me.

It seems to me highly probable that your beautiful and startling discovery, and its illustration by the Stereoscope, may at length call the attention of artists and of the public to the vast importance of our two eyes, with reference to Painting and Perspective; and may lead to the recognition of the true theory of a picture, which I am convinced has *never yet* been propounded.

Ever since the year 1828, this subject, which is cognate with yours, not by any means the same, has engaged a great share of my attention. In that year, I drew up a paper upon it, intended for the Royal Society of Edinburgh; but shrunk from the publication, and never read the paper.

I cannot help feeling persuaded that both Leonardo da Vinci and you have too easily given up the problem as hopeless, when you say (at page 372 of your paper of 1838,) "It will now be obvious why it is impossible for the artist to give a faithful

representation of any near solid object, that is, to produce a painting which shall not be distinguished in the mind from the object itself." Quite true, if it were amongst the conditions of a painting that it should be capable of shifting, so as to suit several different adjustments of the spectator's two eyes; but I see no reason why we should not construct a perfect picture (so far as binocular vision is concerned) which shall be suited to any one given adjustment of the eyes; either when the adjustment is for the nearest part of a solid object, for the furthest part of it, or for any intermediate part.

And herein consists the essential difference of your beautiful results from a picture. Your results, I venture to suggest, much more accurately resemble the reflection of a solid object in a mirror, than they resemble a picture properly so called.

The true theory of a picture I believe to be as follows: Having fixed upon a particular view of an object, at a distance calculated to show it off to the greatest advantage, let us imagine a vertical plane to pass through the principal part of the object chosen; a plane right opposite the spectator, and parallel to the line which joins the centres of his two eyes.

All work, whether portrait, history, landscape, or miniature, ought, I conceive, to be *first constructed of the full size of life or nature* on this imaginary vertical plane passing through the principal part of the principal object, and so as to take into account the spectator's *two eyes*; which eyes are, of course, supposed to be adjusted for the principal object.

All due allowance being thus made for the two eyes, the next step, for either portrait or landscape, is to reduce the whole to a miniature, retaining all the duplications and "regulated obscurities," in strictly the same proportions as in the large-scale picture.

We have been taught heretofore that a picture is produced by intercepting the rays from an object to *one* of the spectator's eyes, upon a vertical plane interposed between the spectator and the object; which theory of perspective, though strictly demonstrable as any proposition in Euclid, for the circumstances supposed, has yet two capital defects. First, that its results are always necessarily less than the

size of nature; and, secondly, that no account is taken of the spectator's two eyes, which is, however, one of the most important provisions in our economy for enabling us to judge of the relative distance and magnitude of near objects.

The law of distinct and single vision with two eyes, by the concurrence of the optic axes at any given point, has long been perfectly known; but its application to painting and perspective appears to have been hitherto entirely overlooked or evaded.

The operation of the law to painting is chiefly upon the background and retiring portions in portrait and history, and chiefly upon the foreground in landscape; the foreground in landscape, and the background in portrait, being, respectively, amongst the greatest of all the difficulties and perplexities that embarrass the student, and even the practised Master.

The production of roundness and relief, in place of hardness and flatness, is chiefly the result of our using both our eyes in painting; which is likewise, I am persuaded, the key to the due subordination of parts, or what the painters call "breadth" and "keeping;" and is one of the main secrets for the production of A WHOLE.

Having made this general statement, perhaps I cannot do better than refer you, for the details in illustration, to the intended paper I have mentioned of 1828, from which the following *verbatim* extracts may serve to convey a clear idea of what I still believe to be the only true and sufficient theory of a picture.

* * * * *

"It is, I presume, well known that while the eyes are directed to a near object, for example, to one's hand or book held a couple of feet off, the objects beyond, say at the distance of six or eight feet, are seen not merely with indistinctness, but double; and, on the contrary, that as soon as the eyes and the attention are principally directed to the more distant object, the nearer one becomes, in its turn, double and indistinct. It occurred to me, that this circumstance afforded some explanation of the background (of a picture) and its peculiar difficulties; for that, so long as the hand or book were the principal objects, and distinctly seen, they might be considered as occupying the place of the head or leading features of a portrait;

while the confused and double and indistinct objects beyond, were in the predicament of the background."

* * * * *

"It appears, further, that each eye, considered separately, admits of an adjustment somewhat similar to that of a telescope or an opera-glass; each particular distance requiring a different adjustment for the purposes of perfectly distinct vision; and as the double images above alluded to, are always seen under circumstances of this species also of false optical adjustment, we may perceive why they should be blurred and indistinct as well as double. They are, moreover, transparent.

"These circumstances must of course be familiar to persons who have attended at all to the subject of optics; although their application to the purposes of painting may not perhaps have been thought of before.

"The instances above described may be considered as extreme cases, short of which there is an indefinite range in either direction, where, without the images being entirely doubled, in consequence of false optical adjustment, there takes place a duplication of outline merely; the two images partly as it were, overlapping each other.

"But, what is true with reference to a portrait and its background, will hold good to a certain extent, in regard also to the retiring and subordinate parts of the head itself. If the spectator's eyes are supposed to remain correctly adjusted for the principal feature, they must, of necessity, be more or less false for the ear, the edge of the hair, neck, and so forth, whose outlines, according to the theory now proposed, ought to be represented more or less indistinct and double, and with the space between, or duplication, semi-transparent.

"Before proceeding any further, I may be permitted to remark, that both in the particular last mentioned, and in much that relates to the background, there appears to be at least some approach in the works of the best Masters, both of ancient and modern times, to the observance of some rule such as that now suggested; the result, in all probability, of a multitude of practical experiments, without much theoretical reasoning on the subject. This circumstance of supposed agreement or confirmation, has been sufficient, in the mean-

time, to encourage me to examine the subject more minutely, with the view, if possible, of ascertaining the amount of these duplications for each variety of distance and other circumstances. I shall attempt, with the permission of the Society, to detail one or two of these theoretical results; the more willingly, because they appear to receive something like support and illustration from the works of the best artists.

The (true) theory of a picture, on the full scale of life, I believe to be as follows: Let us imagine a vertical plane to pass through the object, in actual contact with its principal features, and lines to be drawn from all parts of the object to *each* of the spectator's eyes. This vertical plane, which may be termed the plane of distinct (and single) vision, in works on the full scale of life, is coincident and identical with the theoretical plane of the picture; the 'distance of the picture' being in these circumstances, equal to the full distance of the object itself from the spectator. While the spectator's eyes remain correctly adjusted for the principal features (which are supposed in contact with the said plane), he will perceive a single and distinct image of them; but the rays from each point of all the other parts which lie beyond the plane of distinct vision, will be intercepted in two places by that plane, and those remoter parts will consequently appear double; while, on the other hand, every point nearer the spectator than the precise selected distance, will appear to be projected doubly, and more or less indistinctly (and semi-transparently) on the said plane.

"For any given point, therefore, seen under circumstances of false optical adjustment, we may conceive a small triangle constructed, of which the base is the line joining (the centres of) the spectator's two eyes, and whose lines intersect the plane of distinct vision; the line joining these two points of intersection, being parallel to the line joining the spectator's two eyes. We can thus estimate the breadth of duplication for any given distance beyond the plane of distinct vision. To show this by a figure: let A be the spectator's left eye, and B his right eye; D E the plane of (distinct and single) vision; and C any

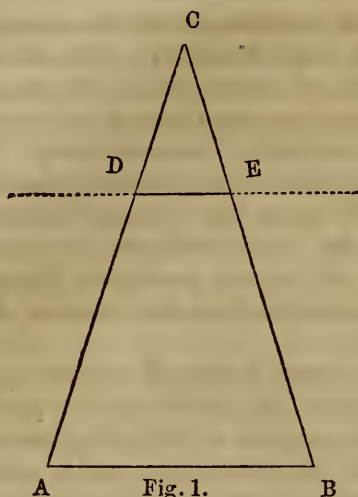


Fig. 1.

point beyond. Then, because D E is parallel to A B,

$$AC : DC :: AB : DE,*$$

giving D E as the breadth of the duplication or error.

"Again, let us suppose the point C to be indistinct and double, in consequence of its being too near the spectator, namely, nearer than the selected plane of distinct vision. We may then construct this figure, in which, as before, A is the spectator's left eye, and B his right eye, and D E the

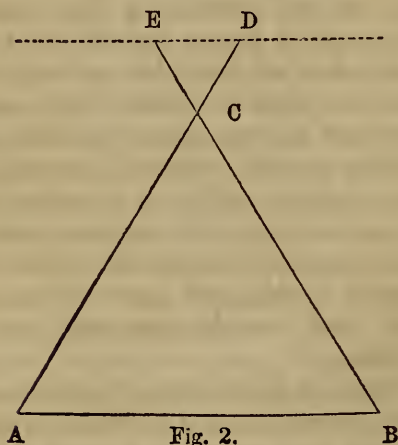


Fig. 2.

plane of distinct vision. In this case, while the eyes remain adjusted correctly for any point in the plane D E, the point C will appear projected on that plane, once for each eye, namely, at D and at E; and this proportion will be found to obtain $AC : CD :: AB : DE$.

"To illustrate this by an example, let

us assume the distance A C (in Fig. 1) as twenty-feet, D C being one foot; namely, the point whose duplication we are in search of, being one foot beyond the plane of distinct vision. Let us further suppose that the distance A B is equal to two inches and a half, or twenty five-tenths of an inch, which is pretty nearly the space between the spectator's two eyes, measuring from the middle of the one to the middle of the other. In these circumstances, D E will be equal to one-tenth of an inch.

"Again, let us suppose another case, likely enough to occur in practice, that A D (in Fig. 1), the distance of the picture, is equal to six feet, or seventy-two inches; and that the point C is three inches further off. Then, A C being equal to seventy-five inches, and D C equal to three inches, and A B equal to twenty-five tenths of an inch, it will follow that in this instance also D E is equal to one-tenth of an inch. For,

$$\begin{array}{ccccccc} AC & : & DC & :: & AB & : & DE \\ 75 & : & 3 & :: & 25 & : & 1 \\ \text{(inches)} & & \text{(inches)} & & \text{(tenths)} & & \text{(tenth)} \end{array}$$

which would furnish one-tenth of an inch as the breadth of the duplication or error required for the ear or any other part three inches retired from the principal features (of a portrait) to be seen at the distance of six feet.

"A somewhat similar application of the rule would give the value of D E (Fig. 2) in cases where the point C is too near for distinct vision; for the edge of the nose, or the hand advanced, or any other part projecting beyond the plane selected as that of distinct vision, which plane, of course, will always intersect the principal features of the portrait.

"This duplication of outline will be found, however, to take place in a horizontal direction only. * * * * This is owing to the horizontal position of the spectator's two eyes, in reference to each other; and the circumstance tends to take off much of the formality which might otherwise be produced by doubling the outlines.

"The extension of this principle to landscape, is rather more complicated: its application is almost solely to the Fore-ground. Let us imagine a great picture of the full size of the objects in nature,

* Prop. 2, 6th bk. of Playfair's Euclid: "If a straight line be drawn parallel to one of the sides of a triangle, it will cut the other sides, or the other sides produced, proportionally."

stretched across the landscape at that precise distance which the painter may have selected for distinct vision, in which choice of course he will be determined by the position of the principal object in the view. Let us next suppose the rules above suggested for the duplications in portrait-painting to be brought into play. This immense imaginary picture being reduced (by a *monocular* operation) to a small scale, with all the duplications preserved in due proportion, would yield an accurate picture, with every allowance made for the spectator's *two* eyes.

"The Foreground of a landscape ought to be generally made indistinct; for it will seldom happen that the principal object occupies the actual foreground.

* * * * *

"The painter is at liberty to select what distance he pleases for distinct vision; but having once made his choice, to be consistent and really accurate, he must be content to sacrifice, more or less, the distinctness of all the rest, whether beyond the principal object, or between it and the spectator.

* * * * *

"It must be kept in mind, that an artist, in the course of his work, is perpetually altering the adjustment of his eyes, to suit distinctly the object or even (subordinate) part of the object with which he happens for the moment to be occupied; but, in so doing, he is in danger of entirely destroying the purity of his work as a whole, by omitting to preserve the due subordination of its part. 'Let the artist' says Sir Joshua Reynolds, 'labor single features to what degree he thinks proper; but let him not forget continually to examine whether, in finishing the parts, he is not destroying the general effect. No work can be too much finished, provided the diligence employed be directed to its proper object; but I have observed that an excessive labor in the detail, has, nine times in ten, been pernicious to the general effect, even when it has been the labor of great masters.'

"Perhaps the Theory now proposed, may afford some sort of key to the danger pointed out in this passage. * * * *

It ought to be the painter's care to represent the projecting and (the) retiring portions of his work as they appear to his own eyes under circumstances of false adjustment."

So much for the extracts from my Paper of 1828. I cannot dismiss this topic without mentioning that in 1829 I enjoyed several opportunities of explaining these views of mine to the late Dr. Wollaston. He said I was correct in theory, but that he feared it would be impossible to apply my notions to practice.

On another occasion Dr. Wollaston said, "If I understand rightly, you would propose a regulated indistinctness in certain parts of a picture?" "Exactly so," was my reply, and I adopt the phrase at once. "Regulated indistinctness" in the subordinate parts of a picture, is precisely what I should recommend, and for which I would point out the law and the measure!

"How does an object look when you are not looking at it?" is a quaint phrase I would likewise adopt from Mr. Charles Landseer, to whom I had an opportunity, the other day, in 1851, of explaining these speculations of mine. While the eyes are adjusted to one object, or part of an object, how do the other objects or parts, *at a different distance, look?*

As for the application of my views to practice, in answer to Dr. Wollaston's difficulty, I must content myself, for the present, with appealing, in illustration, to the best works of the best Masters of effect and execution; with this further caution, that the duplications and even indistinctness must never be obvious and intrusive, so as to attract attention to themselves: the very purpose of the arrangements recommended being *subordination*, or to keep the secondary parts and objects, more or less, out of sight and out of mind.

Moreover, I venture to assert that if a thing be correct in theory, it *must* be applicable to practice, provided only the application is rightly made.

I remain dear Professor Wheatstone,
Yours most sincerely,

JAMES HALL.

From the London Art-Journal.

ON THE HARMONY OF COLORS, IN ITS APPLICATION TO LADIES' DRESS.*

BY MRS. MERRIFIELD.



FROM the draperies we may pass to the consideration of colored bonnets, and caps trimmed with colored ribbons and flowers. And here the question, so frequently discussed, arises, namely, whether a colored bonnet, a pink or blue one, for instance, communicates by reflection as it is reported to do, a pink or blue hue to the skin? M. Chevreul decides from experiments made with colored bonnets on plaster casts, that the influence of reflection is very feeble, even where the bonnet is placed in the most favorable position, and that it is only perceptible on the temples and in a very slight degree.

With regard to caps, or other head-dress, the question of reflection or contrast seems to depend on whether the cap is worn so as to surround and overshadow the face, or whether it is worn at the back of the head. In the first case the color of the trimming, if in sufficient quantity, is in some situations reflected on the face, unless prevented by the interposition of a thick border, or by the hair. Where, therefore, this effect is not desired, the color must not be suffered to approach too near the face, and those colors only should be disposed in contrast with it which will not injure its color by reflection.

In the second case, namely, that in which the cap is placed towards the back of the head, the effect is produced entirely by contrast, in the same manner as in draperies, and no reflection takes place. In bonnets which are not transparent, the effect is also due to the same cause, and those colors should be selected, which by their contrast improve the color of the skin. The effect of color on the inside of a bonnet is modified and softened by its circular and hollow form, which produces a kind of shadow round the face, and by the in-

terposition of the ruche and ribbons or flowers.

The colors of bonnets, and their accordance with the complexion, now claim our attention, and in making a few remarks on this subject, we shall avail ourselves of the experience of M. Chevreul, when it coincides with our own views.

We shall address ourselves first to the fair type.

A black hat with a white feather, or with white, rose-colored, or red flowers, is becoming to fair persons. A plain (opaque) white bonnet is really only suitable to red and white complexions. It is otherwise with bonnets of gauze, crape, and tulle, they are becoming to all persons for the reason before given, namely, that the transparent white produces the effect of grey. White bonnets may be trimmed with white or pink, and especially with blue flowers. A light bonnet is above all others becoming to fair persons; it may be ornamented with white flowers, and in many cases with orange flowers, but never with those of a pink or violet color. A green bonnet is becoming to fair complexions, or to those which are sufficiently pink in the carnations;—

—whose red and white Nature's own sweet and cunning hand laid on; it may be trimmed with white, and especially with pink flowers. A pink bonnet should not be worn in contact with the skin, and if the hair does not separate it sufficiently, it may be removed still further by means of white, or what is preferable, of green. A wreath of white flowers with green leaves, produces a good effect. A red bonnet, more or less intense in color, should be adopted, only with a view to diminish a too ruddy complexion. Neither yellow nor orange bonnets can be recommended, and those of a violet color should be especially eschewed by fair persons.

A black bonnet does not contrast as powerfully with the dark-haired type as with the blonde; it may, however, produce a good effect by means of trimmings of

* Continued from Vol. 3, No. 6, page 362.

white, red, pink, yellow, or orange-color. Next to black and white, and orange and blue, black and yellow is considered the greatest contrast of colors.

The same remarks that were made with respect to white bonnets for fair persons, are equally applicable to those worn by brunettes, except that, for the latter, it will be preferable to have recourse to trimmings of red, pink, orange, or even yellow, rather than to those of blue. Pink, red, and cerise-colored bonnets are becoming to brunettes, when the hair separates, as far as possible, the carnations from the bonnet. White feathers may be placed in a red bonnet, and white flowers, with plenty of green leaves, are adapted for pink bonnets. A yellow bonnet is becoming to a brunette, and its accessories may be violet or blue, according as the yellow inclines to orange or green, but the hair must always be suffered to interpose between the bonnet and the complexion. The same may be said of orange-color, more or less lowered. Blue trimmings are peculiarly adapted to the different shades of orange. Green bonnets suit pale complexions; red, pink, and white flowers should be preferred to all others. Blue bonnets are only favorable to very fair and delicate complexions; they should never be worn by those of a brown or orange. When suited to a brunette, they should receive orange-colored accessories. The effect of a violet-colored bonnet is always unfavorable, because there is no person to whom a yellow complexion is becoming. If, however, not only hair, but yellow accessories, be interposed between the bonnet and the face, a bonnet of this color may be rendered becoming.

Whenever it is found that the color of a bonnet does not produce the expected effect, even when separated from the carnations by large masses of hair, it is advantageous to place, between the latter and the bonnet, such accessories as ribbons, wreaths, detached flowers, &c., of the complementary color to that of the bonnet,—the same color must also appear on the exterior. It is generally advisable to separate the color from the face by the hair, and frequently by a *ruche* of tulle also.

In the olden time there was a custom—“more honored in the breach than in the observance,” “more practised than pro-

fessed,” of substituting artificial complexions for the natural ones in cases in which nature had not been prodigal of her charms, or in which it was desired to conceal the ravages of disease or time;

“——women, to surprise us, spread
Their borrow'd flags of white and red.”

We are sorry to say the practice which Haydocks facetiously calls “*Painting on the life*” was not confined to any age or country. The recent researches into old writers on Art, make us acquainted with the fact that painters were frequently called upon to exercise their skill in this manner upon the living subject. Cennini tells us the Tuscan ladies were especially addicted to this practice, and we infer from a passage in Haydocks's translation of Lomazzo's “*Treatise on Painting*,” that the English ladies were not a whit behind them. The latter author relates an anecdote on this subject which is here transcribed for the amusement of the reader:—

“A conceited gentleman meeting with an Italian painter, asked him this question; whether it was the hardest, to imitate a painted patterne, or to follow the life: who made answer, he could not well tell, and being farther demaunded the reason, how a man of his practice, in a country where the art is so famous, could be ignorant of that, he replied that he thought he had scarce euer drawne any by the life, and therefore could not iudge; because he neuer came time enough, but that some other painter had bin vpon the face, before he came at it. Then the gentleman asked whether it was better working on a table (*i.e.* on wood) or linnen cloth; on neither of these (qud he) so good as on leather, but the better of the two is cloth: And why on leather best, said the gentleman? Because (said the other) with vs the best vse it.

“In this kind (said the Gentl:) I have no skill, and it seemeth to be either a rare secret, or a meere conceit: Howbeit vpon promise that you wil discouer this to me, I will teach you a pretty receipt of great dispatch in your working vpon cloth: Agreed, quoth the painter: I have read (said the gentleman) how a certain King sent a cunning drawer to our Sauour, to take his true counterfeit, which when the Painter could not performe by reason of the exceeding brightness of his countenance, Christ called for a napkin, wherewith wip-

ing his face, he left his exact favour therein.

"Thus shall you doe when you finde your selfe forestalled: onely the difference is, that you must first lightly wet ouer your cloth with the water wherein common seede or saffron hath beene steeped: having thus prepared your cloth, clappe it gently to the face, and your worke is done, except now you meane to make an experiment by the true life, which you tolde me you could neuer come at before. I have often heard of this story saide the Painter, but, neuer had the witte to make vse of it. Yea (said the Gentl:) cunning till it be knowne is accounted a mystery, but being revealed, is esteemed but a tiffle.

"But, sir, to your promise; now shewe me your secret of working on leather. I shall not need, Sir, for you have saued me that labour: for in teaching me how to take of the coloured *complexion*, you have left me bare leather plainly to be seene. The Gentl: perceiving how prettily he was met withall in his owne veine, smiled and shooke handes with the Italian."

So much of the old practice, which, as society is now constituted, we are satisfied will never be revived. We will tell our readers a better method of improving the complexion, upon purely scientific principles, and without having resort to any practice detrimental to health. Some persons, may, perhaps, object that any endeavor to improve the natural complexion is inconsistent with the candor and straightforwardness which is expected of every well-regulated mind. To these it may be replied, in the words of Addison. "Had Tully himself pronounced one of his orations with a blanket about his shoulder, more people would have laughed at his dress than admired his eloquence." We consider that every one has a right to set himself off to the best advantage, when, by so doing, he violates no rule of morality. Channing says, with regard to the dress, "A man who should consult comfort alone in his wardrobe, would find himself an unwelcome guest in circles which he would very reluctantly forego." The complexion may be improved as well as the dress, and we assert that the means we recommend are perfectly legitimate, and such as we are satisfied the most fastidious would approve.

There are, it appears, two methods of

setting off or heightening a complexion, but not of too bright a tone; such, for example is a green drapery for a rosy complexion, or a blue drapery for a blonde. Secondly, by contrasting a fair complexion of an orange hue with a light green drapery, a rosy complexion with a light blue, or a canary yellow or straw-color with certain complexions inclining to orange. In the last case the complementary violet neutralises the yellow of the carnation, which it brightens.

Now let us suppose an opposite case, namely that the complexion is too highly colored, and the object of the painter or dress-maker is to lower it. This may be effected either by means of a black drapery which lowers the complexion by contrast of tone, or by a drapery of the same color as the complexion, but much brighter; for example where the carnations are too rosy, the drapery may be red; where they are too orange, an orange-colored drapery may be adopted; where they incline too much to green, we may introduce a dark green drapery, a rosy complexion may be contrasted with dark blue; or one of a very pale orange with a very dark yellow.

The color of the complexions of the red-skinned or copper-colored tribes of America is too decided to be disguised, either by lowering its tone or neutralising it. A contrary course must therefore be adopted, it must be heightened by contrast; for this purpose white or blue draperies must be resorted to, and blue must incline towards green according as the red or orange prevails in the complexion.

Contrasts of color and tone are still more necessary for black or olive complexions; for such white draperies or dresses of brilliant colors, such as red, orange, or yellow, should be selected. It will be seen, therefore, that the fondness of the West Indian negroes for red and other brilliant colors may be accounted for according to the laws of the harmony of contrast; and that what always has been considered a proof of the fondness of this people for finery, is, in fact, as decided an evidence of good taste as when a fair European with golden hair and blue eyes appears in azure drapery. The partiality of the orientals for brilliant colors, and gold brocades and gauzes, such as we have seen in the Great Exhibition, and which are the produce of

India and China, are in accordance with the same laws, and are in fact the most becoming colors these people could have selected. In articles of clothing and furniture imported from these countries, the positive colors, such as the primitives and secondaries, are generally prevalent;—browns, greys, drabs, and similar broken colors are comparatively rare. The reason is now we trust, evident, the glowing deep-tinted complexions of the inhabitants of these countries require the contrast of powerful and decided colors; and the broken tints, to which the great European painters resorted with a view to enhance the delicate but bright complexions of their fair countrywomen, would not only have been inefficient for this purpose, but would have been actually inharmonious.

The usual dress of the Hindoo servants of the Anglo-Indians is white. The adoption of this dress was probably suggested by motives of cleanliness; but if the *becoming* only had been studied, a better choice could not have been made. We have been much struck with the picturesque and appropriate costume of an Indian Ayah, which consisted of a deep blue dress, while the head and upper half of the figure were enveloped in white calico, which contrasted forcibly with her dark complexion.

From the consideration of the contrast and harmony of different colors with the complexion, we now proceed to remark on the combination and union of different colors in the dress of one individual. It has been observed that the colors worn by orientals are generally bright and warm. The dresses in the Tunisian department of the Great Exhibition were formed of one color, and lined and trimmed with another. Lilac, for instance, was lined with green, with crimson, and vice versa. In many instances the colors were assorted according to the laws of contrast, but this was not always the case, and from the good taste displayed by the orientals as a class, it may be reasonably concluded that these imperfectly assorted colors were intended to be harmonized by the color of other articles, (the turban, or sash, for instance) necessary to complete the dress. In the dresses of English ladies we find too frequently a variety of colors, without any pretensions to harmony of arrangement. Not only is the dress or bonnet selected without the slightest consideration, whether it is, or is not, suitable to the complexion, but a variety of colors of the most dissonant and inharmonious kinds may frequently be seen in the habiliments of the same lady.

TO BE CONTINUED.

WHAT THE SUNBEAM DOES.



EAT, or the coloric portion of the sunbeam, is the great cause of life and motion in this our world. As it were with a magical energy, it causes the winds to blow and the waters to flow, vivifies and animates all nature, and then bathes it in refreshing dew. The intensity of the heat which we receive depends on the distance of the earth from the sun, its great source, and still more on the relative position of the two orbs; since in winter we

are nearer the sun than we are in summer, yet, in consequence of the position of the earth at that season, the sun's rays fall obliquely on its northern hemisphere, rendering it far colder than at any other period of the year.

A great portion of the heat-rays which are emitted by the sun are absorbed in their passage through the atmosphere which surrounds our globe. It is calculated that about one-third of the heat-rays which fall on it never reach the earth, which fact adds another to the many beneficent purposes fulfilled by our gaseous envelop, screening us from the otherwise scorching heat. It

is curious to trace the varied fates of the calorific rays which strike on the surface of the earth. Some at once on falling are reflected, and, passing back through the atmosphere, are lost amid the immensity of space; others are absorbed or imbibed by different bodies, and, after a time, are radiated from them; but the greater part of the beams which reach the earth during the summer are absorbed by it, and conveyed downward to a considerable distance, by conduction from particle to particle. Heat also spreads laterally from the regions of the equator toward the poles, thereby moderating the intense cold of the arctic and antarctic circles, and in winter, when the forest trees are covered with snow, their deeply penetrating roots are warmed by the heat, which, as in a vast store house, has been laid up in the earth, to preserve life during the dreary winter. The rays which fall on the tropical seas descend to the depth of about three hundred feet. The sun's attraction for the earth, being also stronger at that quarter of the world, the heated waters are drawn upwards, the colder water from the poles rush in, and thus a great heated current is produced, flowing from the equator northward and southward, which tends to equalize the temperature of the earth. The sailor also knows how to avail himself of this phenomenon. When out at sea, despite his most skillful steering, he is in constant danger of shipwreck, if he fails to estimate truly the force and direction of those currents which are dragging him insensibly out of the true course. His compass does not help him here, neither does any log yet known give a perfectly authentic result. But he knows that this great gulf-stream has a stated path and time, and, by testing from hour to hour the temperature of the water through which he is proceeding he knows at what point he is meeting this current, and reckons accordingly.

We have already said that heat was the producer of the winds, which are so essential to the preservation of the purity of the atmosphere. In order to understand their action, we shall consider the stupendous phenomenon of the trade-winds, which is similar to that of the current we have described. The rays of the sun falling vertically on the regions between the tropics the air there becomes much heated. It is

the property of air to expand when heated, and, when expanded, it is necessarily lighter than the cooler air around it. Consequently it rises. As it rises, the cooler air at once takes its place. Rushing from the temperate and polar regions to supply the want, the warm air which has risen flows towards the poles, and descends there, loses its heat, and again travels to the tropics. Thus a grand circulation is continually maintained in the atmosphere. These aerial currents being affected by the revolution of the earth, do not move due north and south, as they otherwise would. Hence, while they equalize the temperature of the atmosphere, they also preserve its purity; for the pure oxygen evolved by the luxuriant vegetation of the equatorial regions is wafted by the winds to support life in the teeming population of the temperate zones, while the air from the poles bears carbonic acid gas on its wings to furnish food for the rich and gorgeous plants of the tropics. Thus the splendid water-lily of the Amazon, the stately palm-tree of Africa, and the great banyan of India, depend for nourishment on the breath of men and animals in lands thousands of miles distant from them, and, in return, they supply their benefactors with vivifying oxygen.

Little less important, and still more beautiful, is the phenomena of dew, which is produced by the power of radiating heat, possessed in different degrees by all bodies. The powers both of absorbing and of radiating heat, in a great measure, depend on the color of bodies—the darker the color, the greater the power; so that each lovely flower bears within its petals a delicate thermometer which determines the amount of heat each shall receive, and which is always the amount essential to their well-being. The queenly rose, the brilliant carnation, the fair lily, and the many-colored anemone, all basking in the same bright sunshine, enjoy different degrees of warmth and when night descends, and the heat absorbed by day is radiated back, and bodies become cooler than the surrounding air, the vapor contained in the atmosphere is deposited in the form of dew. Those bodies which radiate most quickly receive the most copious supply of the refreshing fluid. This radiating power depends on the condition of the surface, as well as upon color, so that we may often see the grass

garden bathed in dew, while the gravel walks which run through it are perfectly dry, and, again, the smooth, shining, juicy leaves of the laurel are quite dry, while the rose-tree beneath it is saturated with moisture.

The great effect produced on the vegetable kingdom, by the heat-rays, may be judged of from the fact, that almost all the plants which exhibit the remarkable phenomena of irritability, almost approaching to animal life are confined to those regions where the heat is extreme. On the banks of the Indian rivers grows a plant in almost constant motion. In the hottest of the conservatories at Kew is a curious plant, whose leaflets rise by a succession of little starts. The same house contains Venus's fly-trap. Light seems to have no effect in quickening their movements; but the effect of increased heat is at once seen. They exhibit their remarkable powers most during the still hot nights of an Indian summer.

Heat is of essential importance in the production and ripening of fruit. Many trees will not bear fruit in our cold climate which are most productive in the sunny south. Animal as well as vegetable life is in great measure dependent on heat. Look at the insect tribes. The greater number of them pass their winter in the pupa state.

Hidden in some sheltered nook, or buried in the earth, they sleep on, until the warmth of returning spring awakens them to life and happiness; and if, by artificial means, the cold be prolonged, they still sleep on, whereas, if they be exposed to artificial heat, their change is hastened, and butterflies may be seen sporting about the flowers of a hothouse, when their less favored relatives are still wrapt in the deepest slumber. To judge of the influence of heat on the animal and vegetable economy, we need but contrast summer and winter—the one radiant and vocal with life and beauty, the other dark, dreary, and silent.

The third constituent of the sunbeam is actinism—its property being to produce chemical effects. So long as 1556, it was noticed by those strange seekers after impossibilities, the alchemists, that horn silver exposed to the sunbeam, was blackened by it. This phenomenon contained the germ of those most interesting discoveries which have distinguished the present age;

but, in their ardent search for the philosopher's stone and the elixir of life, they overlooked many an effect of their labors which might have led them to important truths.

As yet, the effects of actinism have been more studied in the inanimate than the organic creation. Still, in the vegetable kingdom, its power is known to be of the utmost importance. A seed exposed to the entire sunbeam will not germinate; but bury it in the earth, at a depth sufficient to exclude the light, yet enough to admit actinism, which, like heat, penetrates the earth to some distance, and soon a chemical change will take place; the starch contained in the seed is converted into gum and water, forming the nutriment of the young plant; the tiny root plunges downward, the slender stem rises to the light, the first leaves, or cotyledons, then unfold, and now fully expand to the light, and a series of chemical changes of a totally different nature commence, which we have before noticed when speaking of light. Experiments clearly prove that this change is to be attributed to actinism, and not to heat. Glass has been interposed of a dark blue color, which is transparent to actinism though opaque to light and heat, and germination has been thereby quickened. Gardeners have long known this fact practically, and are accustomed to raise their cuttings under blue shades. There is no doubt that actinism exercises a powerful and beneficent influence on plants during their whole existence, but science has yet to demonstrate its nature; and it is curious to observe that the actinic element is most abundant in the sunbeam in the spring, when its presence is most essential in promoting germination—in summer the luminous rays are in excess, when they are most needed for the formation of woody fibre—and in autumn the heat-rays prevail, and ripen the golden grain and the delicious fruit; in each day the proportions of the different rays vary—in the morning the actinic principle abounds most, at noon the light, and at eventide the heat.

The influence of actinism on the animal world is not well known; but it is probable that many of the effects hitherto referred to light are in reality due to actinism. It has the strange power of darkening the human skin, causing the deep color of those

ribes who inhabit the sunniest regions of the earth; and even in our own country, in summer, that darkening of the skin called sun-browning. Doubtless, more careful investigation will discover this principle to be equally important to the life and health of animals as either of its closely allied powers of life and heat.

Our knowledge of actinic influence on inanimate nature is not so scanty, for it is now a well established fact, that the sunbeam cannot fall on any body, whether simple or compound, without producing on its surface a chemical and molecular change. The immovable rocks which bound our shores, the mountain which rears its lofty head above the clouds, the magnificent cathedral, the very triumph of art, and the beautiful statue in bronze or marble, are all acted on destructively by the sunbeam, and would soon perish beneath its irresistible energy, but for the beautiful provision made for their restoration during the darkness of night—the repose of darkness being no less essential to inorganic, than it is to animated nature. During its silent hours, the chemical and molecular changes are all undone, and the destruction of the day repaired, we know not how.

The art of painting by the sunbeam has been rather unfortunately called photography, which means light-painting, for the process is not due to light, but is rather interfered with by it; and, contrary to all preconceived ideas, the pictures taken in our comparatively sombre country, are more easily and brilliantly produced than in brighter and more sunny lands—so much so, that a gentleman who took the requisite materials to Mexico, in order to take views of its principal buildings, met with failure after failure, and it was not until the darker days of the rainy season that he met with any measure of success.

REMARKS BY THE EDITOR OF THE PHOTOGRAPHIC ART-JOURNAL.

This portion of our author's subject might have been much enlarged upon with benefit to his readers. There is a popular error prevalent that daguerreotypes can only be taken successfully on the clearest and brightest days of summer, and the consequences are that on such days most of

the galleries of our best artists are crowded with anxious applicants for "counterfeit presentiments" who are frequently obliged to call again and again before they are satisfied with the result; a circumstance much more annoying to the photographer than sitter.

Much has been said as to the power of light in the production of daguerreotype pictures, but, unfortunately, the early errors of writers on this subject have obtained such a wide spread circulation, and become so fixed in the public mind, that to eradicate them is a labor of time.

The facts recently established by the experiments of the most profound writers on the art of photography, prove most conclusively that during the intense heat of the day, light is far less active in the development of the daguerreotype, and far less effective in its results; the picture produced being flattened, less round and solid, of a harsh tone, and often of a sickly cast. The reasons for these defects are now well established, and are entirely owing to the suppression of actinic influence by the prevalence or general diffusion of the yellow rays through the atmosphere, which is particularly the case on very warm hazy days. This state of the atmosphere is almost constant during the summer months in the United States, particular south of Mason and Dixon's line, while in Mexico, Texas, and all tropical climates, it is unvarying, rendering the attempts to take daguerreotypes so unavailing, that many artists who have gone to those countries in the expectation of reaping an abundant harvest have been obliged to return disappointed, and often penniless.

It is unnecessary for us here to enter into a philosophical argument as to the causes of this state of the atmosphere. The works of Prof. Hunt, and others, which we have already published in this Journal, have treated the subject in a more

masterly manner than we possibly can, and those of our subscribers who have read them attentively, could only do so to their lasting benefit.

Some of the best daguerreotypes we have ever seen, were taken in cloudy weather, just before and after storms. At this time the atmosphere is remarkably clear, and not the slightest traces of yellow can be detected in it by the eye.

Considering the difficulty of obtaining daguerreotypes on hot bazy days, it is strange to us that so few of our artists endeavor to correct the evil it imposes upon them, particularly as it seems so utterly impossible to disabuse the public mind of the idea that such light is the most propitious. *The evil can be corrected by a very simple remedy*, a remedy we have frequently urged upon our readers, and which actual experiment has convinced us is certain in its results. We allude to the construction of skylights with blue glass, a material giving uniform results, and with a constancy truly remarkable. Our friend Hesler, in his communication in the present number, recommends the interposition of blue tissue paper to subserve similar purposes. The use of tissue paper is nearly as old as the daguerrean art itself, and those who employ it do so to their advantage, but it is not sufficiently transparent for

all the purposes intended. The blue Bohemian glass, if used, would correct one-half the difficulties under which our operators work, and we have not the slightest doubt that if those daguerreotypists, who have gone to Texas, Mexico, and other tropical countries and have been obliged to return unsuccessful, had constructed their skylights of this material, they would not have had to mourn over the time so lost.

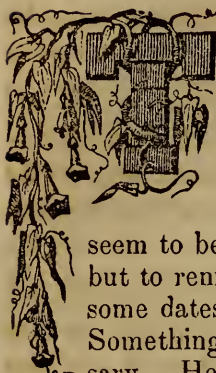
The principal idea obtained against the adoption of blue glass is that it will increase the time of exposition. This is a fallacy which a very simple experiment will disprove. Take a piece of blue Bohemian glass, say one foot square, and, during the exposition of the plate in the camera, place it before the sitter in such a manner that one-half of the face may be covered by it. On examining the picture thus produced, you will find that portion of it covered by the glass equal, in every particular, to that uncovered. The two portions of the face will be marked, however, in this instance, by a dark line caused by the edge of the glass, a circumstance which cannot occur with the glass in the skylight, or if placed fully before the sitter. Traveling artists can obviate the difficulty in a measure, by inserting a piece of light blue glass in the camera tube before the lenses.

THE GREEK SLAVE.—Mr. Copeland is about to add to his series of beautiful porcelain statuettes, one of Powers' well-known figures, which will doubtless rival, if not exceed, in popularity many that have preceded it. A mould was made, by Signor Brucciani, from the original, when it stood

in the Crystal Palace, and casts have been taken from it, one of which may now be seen at Mr. Copeland's establishment in Bond Street: it is a highly successful copy. The cast is to be reduced by Mr. Cheverton's instrument to the size proposed for the statuette.

LIFE OF BENJAMIN WEST.

BY A. CUNNINGHAM.



THE life of West has been written by the ingenious author of "Annals of the Parish," with such minuteness of research and general accuracy of information, that little may seem to be left for a new biographer but to remodel his narrative, correct some dates, and add a few anecdotes. Something more, however, is necessary. He who writes the biography of any living person, is fettered much even as to matters of fact—much more in his expression of feelings and opinions—and not only was the President alive when Mr. Galt composed his memoir, but they were intimate friends.

John West, the father of Benjamin, was of that family settled at Long Crendon, in Buckinghamshire, which produced Colonel James West, the friend and companion in arms of John Hampden. Upon one occasion, in the course of a conversation in Buckingham Palace, respecting his picture of the Institution of the Garter, West happened to make some allusion to his English descent; when the Marquis of Buckingham, to the manifest pleasure of the late king, declared that the Wests of Long Crendon were undoubted descendants of the Lord Delaware, renowned in the wars of Edward the Third and the Black Prince, and that the artist's likeness had therefore a right to a place among those of the nobles and warriors in his own piece.

The warlike propensities of this branch of the race had been long extinguished; in 1667 they had embraced the peaceful tenets of the Quakers, and emigrated to America with some other families desirous of escaping from the contests and distractions of their native isle. John West remained behind only till his education was completed at the Quakers' Seminary at Uxbridge: he then followed his family to Philadelphia—married Sarah Pearson (whose grandfather was the confidential friend of William Penn, and aided him in founding the state of Pennsylvania),—and settled at Springfield in that province. One part of the marriage portion of his

wife was a negro slave, an affectionate and faithful creature; but in his intercourse, as a merchant, with Barbadoes, John West happened to witness the cruelties to which certain unhappy Africans were subjected, and—touched in conscience—the worthy Quaker liberated his bondsman and retained him as a hired servant. Others of the Society of Friends followed his example—the charitable feeling spread far and wide—it was privately taught and publicly preached, and finally established as one of the tenets of that people, that no person could remain a member of their community who held a human creature in slavery.

When Mrs. West, already the mother of nine children, was again about to be confined, she went to hear one Edward Peckover preach in the fields near her residence. The subject which he chose was popular with such an audience—the corrupt and degraded condition of the Old World—the pure morality and flourishing establishments of the New. The language of the preacher was vehement and inflammatory. He pictured the licentious manners and atheistical principles of France, and the love of sordid gain which stained the character of England; and declared that the day and the hour were at hand, when those countries would be desolated with the tempest of God's vengeance—the mass of the atheists and money-changers swallowed up—and the terrified remnant would seek refuge in happy America. The pains of premature labor came upon Mrs. West during this terrible sermon—she shrieked out—the women formed a circle round her, and carried her from the field; and such was her agitation of mind, that she had nearly expired before she reached her own house. She continued dangerously ill for twelve days, when (October 10th, 1738) she was safely delivered of her youngest son, Benjamin.

This made some impression on the mind of John West, and as the presumption of man generally interprets such occurrences in his own favor, he imagined that something more than common was indicated for the fortunes of the child. Peckover, glad, no doubt, to find that his wild sermon in-

stead of rebuke brought praise, warmly supported the belief of the credulous Quaker, and desired him to watch over his son with more than ordinary solicitude. "For a child," said he, "sent into the world under such remarkable circumstances, will assuredly prove a wonderful man." One lucky prediction establishes the fame of the prophet, but there are thousands on whose future fame friends and parents fondly reckoned, in whose favor "remarkable circumstances" too condescended to occur, and who remain inglorious in spite of the stars.

From one thus ushered into life by sermon and prophecy much was looked for. Nothing, however, happened till his seventh year, when little Benjamin was placed with a fly-flap in his hand to watch the sleeping infant of his eldest sister, while his mother gathered flowers in the garden. As he sat by the cradle, the child smiled in sleep; he was struck with its beauty, and seeking some paper, drew its portrait in red and black ink. His mother returned, and snatching the paper which he sought to conceal, exclaimed to her daughter, "I declare he has made a likeness of little Sally!" She took him in her arms and kissed him fondly. The drawing was shown to her husband, the prediction of Peckover recurred to his fancy, and he expressed his hope that the boy would become some day very eminent. If he meant as an artist, how this was to come to pass must have seemed, however, not so clear: there were neither professors, paintings, nor prints among the primitives of Pennsylvania.

Yet West was born amid circumstances not unfavorable to the development of his powers. The benevolent fraternity of Quakers had that simplicity of manners, and that serenity of look which artists love; while around them the nations of Europe had scattered their children as thick as the trees of the forest. The gay Frenchman, the plodding Dutchman, the energetic Englishman, and the laborious Scot—all were there, each emblazoned with the peculiarities, and speaking the peculiar language of his native soil. The wilderness, too, had its picturesque tribes, who presented a school of nature for the study of the naked figure; and it appears that West

was early aware of some of these advantages.

When he was some eight years old, a party of roaming Indians paid their summer visit to Springfield, and were much pleased with the rude sketches which the boy had made of birds, and fruits, and flowers, for in such drawings many of the wild Americans have both taste and skill. They showed him some of their own workmanship, and taught him how to prepare the red and yellow colors with which they stained their weapons; to these his mother added indigo, and thus he was possessed of the three primitive colors. The Indians, unwilling to leave such a boy in ignorance of their other acquirements, taught him archery, in which he became expert enough to shoot refractory birds, which refused to come on milder terms for their likenesses. The future President of the British Academy, taking lessons in painting and in archery from a tribe of Cherokees, might be a subject worthy of the pencil.

The wants of West increased with his knowledge. He could draw, and he had obtained colors, but how to lay those colors skilfully on, he could not well conceive. A neighbor informed him that this was done with brushes formed of camels' hair; there were no camels in America, and he had recourse to the cat, from whose back and tail he supplied his wants. The cat was a favorite, and the altered condition of her fur was imputed to disease, till the boy's confession explained the cause, much to the amusement of his father, who nevertheless rebuked him, but more in affection than in anger. Better help was at hand. One Pennington, a merchant, was so much pleased with the sketches of his cousin Benjamin that he sent him a box of paints and pencils, with canvass prepared for the easel, and six engravings by Grevling. West placed the box on a chair at his bedside, and was unable to sleep. He rose with the dawn, carried his canvass and colors to the garret, hung up the engravings, prepared a palette, and commenced copying. So completely was he under the control of this species of enchantment, that he absented himself from school, labored secretly and incessantly, and without interruption for several days, when the anxious inquiries of the schoolmaster intro-

duced his mother to his *studio* with no pleasure in her looks. But her anger subsided as she looked upon his performance. He had avoided copyism, and made a picture composed from two of the engravings, telling a new story, and colored with a skill and effect which was in her sight surprising. "She kissed him," says Galt, who had the story from the artist, "with transports of affection, and assured him that she would not only intercede with his father to pardon him for having absented himself from school, but would go herself to the master and beg that he might not be punished. Sixty seven years afterward the writer of these memoirs had the gratification to see this piece in the same room with the sublime painting of Christ Rejected, on which occasion the painter declared to him that there was inventive touches of art in his first and juvenile essay, which, with all his subsequent knowledge and experience, he had not been able to surpass."

In the ninth year of his age he accompanied his relative Pennington to Philadelphia, and executed a view of the banks of the river, which pleased a painter, by name Williams, at that time residing there. This Williams's works—the first specimens of true art that the boy had seen—affected West so much that he burst into tears. The artist was surprised, and declared, like Peckover, that Benjamin would be a remarkable man. "What books do you read?" said Williams; "you should read the lives of great men." "I read the Bible and the Testament," replied West; "and I know the history of Adam, and Joseph, and Moses, and David, and Solomon, and the Apostles." "You are a fine boy," said the other, "and ought to be encouraged. I shall send you two books which you will like much." He sent him, accordingly, Du Fresnoy and Richardson, with an invitation to call, whenever he pleased, and see his pictures. The books and the pictures made the love of art overcome all other feelings, and he returned home, resolved to become a painter. John West was struck with the growing intelligence and expanding mind of the boy; his sketches and drawings were now openly encouraged, and that he was destined to be a great artist grew more and more the opinion of his family.

One of his school-fellows allured him on a half-holiday from trap and ball, by promising him a ride to a neighboring plantation. "Here is the horse, bridled and saddled," said his friend, "so come, get up behind me." "Behind you!" said Benjamin; "I will ride behind nobody." "Oh, very well," replied the other, "I will ride behind you, so mount." He mounted accordingly, and away they rode. "This is the last ride I shall have," said his companion, "for some time. To-morrow I am to be apprenticed to a tailor." A tailor!" exclaimed West; "you will surely never be a tailor?" "Indeed but I shall," replied the other; "it is a good trade. What do you intend to be, Benjamin?"—"A painter." A painter! what sort of a trade is a painter? I never heard of it before."—"A painter," said this humble son of a Philadelphia Quaker, "is the companion of kings and emperors." "You are surely mad," said the embryo tailor; "there are neither kings nor emperors in America."—"Aye, but there are plenty in other parts of the world. And do you really intend to be a tailor?"—"Indeed I do; there is nothing surer." "Then you may ride alone," said the future companion of kings and emperors, leaping down; "I will not ride with one willing to be a tailor." This incident, it is said, together with his skill in drawing, which now began to be talked of, drove the schoolboys of Springfield to walls and boards with chalk and ochre. This was only a temporary enthusiasm, and soon subsided; yet many of their drawings, West, afterwards said, were worthy of the students of a regular academy. Their proficiency, then, had surpassed his own; for even when at Rome he was unwilling to show his drawings, considering them as imperfect and incorrect.

He was often at a loss for the proper materials of his art; pencils, and colors, and panels were not then included in the articles of daily demand in Pennsylvania. A carpenter, whose name is forgotten, gave him three broad and beautiful poplar boards, and planed them smoothly; these when covered with groups in ink, chalk, and charcoal, were purchased for a dollar each by a neighbor of the name of Wayne, and Dr. Morris at the same time gave him money to buy panels and pencils for future

compositions. "These were the first public patrons of the artist," says Galt, "and it is at his own request that their names are thus particularly inserted."

That a boy who had some skill in painting lived at Springfield, began to be spoken of; and Mr Flower a justice of Chester, looked at his works, and obtained leave from his parents to take him for a few weeks to his house. A young English lady was governess to his daughters; she was well acquainted with art and was also intimate with the Greek and Latin poets, and loved to point out to the young artist the most picturesque passages. He had never before heard of Greece or of Rome, or of the heroes, philosophers, poets, painters, and historians, whom they had produced, and he listened, while the lady spoke of them, with an enthusiasm which, after an experience of seventy years in the world he loved to live over again. His residence here introduced him Ross, a lawyer of some note, who lived in the neighboring town of Lancaster; and Mrs. Ross, who was eminently beautiful, desired to sit to West for her portrait. The people of Lancaster had taste and intelligence; they saw him perform his task with much ability, and came in such crowds to sit to the boy, that he had some trouble in meeting their demands. Those citizens were kindly persons, and easily pleased. A gunsmith of Lancaster, who had a classical turn, proposed a painting of the death of Socrates. West had heard of Socrates, and forthwith made a sketch which his employer called clever: but he had now begun to feel his deficiencies and see his difficulties. "I have hitherto painted faces," said West, "and people clothed; what am I to do

with the slave who presents the poison—he ought, I think, to be naked." Henry, the gunsmith, went to his shop, and returned with one of his workmen, a handsome man, and half-naked, saying, "There is your model." He introduced him accordingly into the picture—which excited some attention.

West was now fifteen years old; and though the school has been more than once spoken of, his education up to this period had been sadly neglected: indeed, at no period of his life had he any claim to be called an educated man. He was the first and last president of our academy who found spelling a difficulty.

Dr. Smith, a gentleman of considerable classical attainments, perceived his deficiency, and generously undertook the part of instructor; but the Cherokee Indians seem to have been the only preceptors who went wisely to work with him. This new master pursued a strange enough method. "He regarded him," says Galt, "as destined to be a painter, and on this account did not impose upon him those grammatical exercises of language which are usually required from the young student of the classics, but directed his attention to those incidents which were likely to interest his fancy, and furnish him, at some future period, with subjects for the easel." This might have done well with a fairer scholar—with West, if it was desired that his imagination should catch the life and spirit of antiquity, he ought to have begun nearer the beginning. It is needless to expect a strong crop, when we have only scratched the surface of the soil.

TO BE CONTINUED.

ANECDOTE OF B. R. HAYDON.—It was generally allowed that Haydon was a better lecturer than painter, his literary knowledge was considerable, and he was a great buyer of books. Some few weeks before his death, he called on a bookseller of whom he frequently purchased, and brought a packet

he had recently obtained from him, which he returned, remarking "I will keep these no longer, I find I am too poor to pay for them, though I much want them; but you shall not be inconvenienced by my necessities, take them, and make a better market elsewhere."

GOSSIP.



SINCE we commenced the publication of this Journal, the art of photography has made rapid strides all over the world; not so much in the new discoveries made as in improvements of the old. In France MM. Evrard, Le Gray, Renard, Mestral and others, have so improved the processes on paper that many have thrown entirely aside the metallic plate; so also in England, notwithstanding the shackles thrown around the art by Talbot's patents.

In our own country few have attempted with any degree of success this branch, until the persevering efforts of Mr. Whipple of Boston, has won for him the praise of all who have seen his fine photographs. For ourselves we must give the preference to paper photographs, over the daguerreotype, although we have no doubt it will be many months, perhaps years, before the latter will be superceded by the former, principally on account of the daguerreotype being much less difficult, and consequently cheaper.

Those, however, who first introduce the paper process to the public in our large cities, will undoubtedly make money, for there are very few men of taste who would not prefer the beautifully bold, warm toned and mezzotint-like photograph, to the cold, semi-distinct and glaring daguerreotype.

There is one great drawback to any decided improvement in the daguerrean art in this country, equally applicable to those who preach reform and improvement

as to those who deride and scoff at it. We have often spoken of it and we mean still oftener to speak of it, until we have succeeded in putting sufficient ambition into the minds of our artists to make farther comment unnecessary. We mean that selfish, mean disposition of keeping every improvement made a secret. What artist in this country has ever derived one cent advantage over his brother artist by such a course?

We venture to say, not one. In the whole course of our observation we can only point to such persons as objects of ridicule and suspicion.

To sustain us in our assertions we have only to point out the liberal course of Mr. Hesler, of Galena, Ill., Whipple, of Boston, Davie, of Utica, Johnson and others of this country, and Claudet of London, as eminent examples of the success of those who make known their improvements to the public. The former gentleman particularly has been most liberal in communicating his knowledge, and the consequence is an overflowing patronage. By this liberal course to his fellow artists he has gained the entire confidence of the public, and his success in consequence is unprecedented at the west. We know that while others in that region are merely doing what is called a paying business he is making a fortune.

It is much to be regretted that there is so little sympathy or liberality among our American Daguerreotypists, but we look forward to the time when the sentiments now prevalent will take to themselves wings and flee away. When that day arrives a new era will dawn upon the art in this country, and some advancement will be made.

— HILL AND THE HILLOTYPES — Those of our readers who do not believe in the "Hillotype" must not censure us for publishing the following article from the *Rochester Daily American*; as they should remember that there are always two sides to a question, and that in a Journal like ours, both sides should always find a space, where one has been discussed.

In another part of our Gossip will be found an authentic anecdote which was crowded out of our last to give place to more important matter, and which we publish as related to us—and we must here remark that if we could believe Mr. Heath's statement, we should get rid of what little faith we have in the discovery as soon as possible, notwithstanding that it is currently reported that Mr. Hill holds the certificates of M. M. Lawrence, J. Gurney, W. & W. H. Lewis, and M. A. Root, as to the truth of all his assertions.

We will further state that Mr. Heath told us, personally, three months ago, that he was perfectly conversant with every particular concerning Mr. Hill's discovery, that it was perfect, and that there was no reason why Mr. Hill should not bring it before the public the very next day. We have also conversed with several others who have called on Mr. Hill, who has professed to have shown them veritable "Hillotypes," but which they pronounced mere transfers, neither taken from life nor in the camera. It is also but a very few days since we put the question to one of those who are said to have given Mr. Hill certificates: "Have you seen Hillotypes taken in the camera from life?" He shook his head in a semi-mysterious manner, and replied, "He said they were."

We have also been informed that there has been an attempt to dissolve the AMERICAN DAGUERRE ASSOCIATION of this city, and re-organize it so as to admit those only who are favorably disposed towards

Mr. Hill, and who are to receive the benefits of his discovery. And again, that the defunct Daguerrean Journal was ostensibly purchased by persons in the interest of Mr. Hill, and was intended to be entirely devoted to him, and that the non-fulfillment of their contract with Mr. Humphrey obliged him, in self defence, to publish his present Journal.

The last rumor is that Mr. Hill has truly perfected his discovery, and is now engaged in investigating the various phases of his process, before taking out a patent, in order that there may not be the slightest chance for interlopation, or modification, thus depriving him of the fruits of his labor. This is the most reasonable and sensible excuse we have had yet given us for the non-fulfillment of his contract with the public, and we trust it is the true one.

We have now given all the rumors and doings in the Hillotype case that have come to our knowledge, without vouching for a word of their truth, and our readers must accept them for what they are worth, and draw their own conclusions.

The last number of the Ulster Co. Examiner, published at Rondout, contains an elaborate history of the discovery, progress and position of the much talked-of Hillotype. We have learned but little of it or its inventor for the last few months, and we were led to suppose that the adverse report of the committee appointed to investigate the claims of the discovery was in all particulars correct. But it would seem from the article under consideration, prepared by Mr. Gosman, the intelligent editor of the Examiner, after a thorough personal examination of the whole subject, that great injustice has been done to Mr. Hill, and that the discovery is not only a *bone fide* one of the utmost interest and importance, but that he has so nearly perfected it, that it cannot be long now before it will be brought out, and submitted to the public.

Mr. Hill is a resident of Westkill, Greene Co. The Examiner gives an interesting narrative of the discovery of his

process of daguerreotyping in colors, and its progress, and illustrates the present position of the "Hillotype" in the following notes of "A visit to Westkill."

MR. HILL AND HIS HILLOTYPES.—On the morning of the 24th of May, the writer with a friend visited Mr. Hill's studio at Westkill. After some conversation, Mr. Hill exhibited some dozen or more "Hillotypes" on large sized plates. They were the transfers of elaborate colored French engravings. In these the most diversified and delicate hues and tints were rendered with the most beautiful distinctness. It was especially noted by the writer that all shades of yellow, (Mr. H. had been puzzled by this color at his outset,) running through all gradations, from the richest aureole to the faintest tint in a complexion, were freely and transparently rendered. These specimens (indiscriminately taken from Mr. Hill's more recent experiments) showed every conceivable combination of original colors, many of the prints being colored solely with reference to the exhibition of contrasts, combinations and shades.

Besides these, the writer saw four Hillotypes from life, preserving all the colors of nature. One of cameo size was a fine female head, with the hair in Jenny Lind style, and the other the same head in a green silk bonnet, the most minute colors in the dress being given to the life. These two portraits were exquisitely natural in color, and the subject was a fine looking specimen of the mountain girl, in all the bloom of vigorous youth. But the lack of knowledge of the original which to these was a drawback to a full appreciation as well as to that of a fine portrait of an elderly woman, could not be pleaded as to the fourth, which was a Hillotype, on a larger plate, of the artist's daughter, a child of some six years old.

This latter the writer regarded as an ample vindication of Mr. Hill's claims in their widest sense. In want of a subject one morning, Mr. H. requested the mother to bring in the child. A variegated table cover was hastily thrown over a trunk, and the child, taking an easy recumbent position, in a few seconds was depicted upon the plate with all the force of nature. By fortunate accident all the more vivid

tints of red, green and blue were included in the dress and accessories, and scanning the portrait beside the child, left the writer no ground for skepticism as to the consummation of the discovery. The complexion, the very peculiar tint of the hair, the color of the eyes, nay the faint pink of the finger tips were all there, mirrored in all the freshness of breathing life.

The writer will add that the uncovered plates were put in his hands for the most rigid examination by the full light of an unclouded summer day. And one which had not been burnished, was put to that process in his presence, when it took in an instant, the rich enamel surface, which distinctly marks the Hillotype from those of the Daguerreotype. The fact is, (as we saw from experiment,) the Hillotype is very difficult to remove from the plate as compared with the Daguerreotype, nor is it sensitive to the effect of the atmosphere like the latter.

This statement is sufficient, we presume, so far as the evidence of a witness can establish a fact of this kind. Other corroborative and explanatory statements might be made, but the writer has no idea of imperilling Mr. Hill's secret in the most remote degree, by stating anything beyond the line of effects to which he could testify without hesitation on any score.

Nor does this narrative cover any more ground, we believe, than has already been taken by those better known to the world than the editor of the Examiner. Mr. Hill holds certificates from Professor Morse, Mr. Root, and others, certifying in full to the extent of his statement.

The writer closes this statement with the hope that Mr. Hill will be one of the exceptions to the rule that inventors do not reap the reward of their genius. He has met the most discouraging obstacles in his labors, and has overcome them with heroism. That he can pronounce his work well nigh accomplished, and that it will soon be given to the world, the writer believes. And it ought to be remembered to the praise of the inventor, too, that he has carried on all the operations alone; every process, down to the merest mechanical operations, having been accomplished single handed.

Since the above was in type we have re-

ceived a number of the *Rondout Examiner*, containing the following :

Some eighteen months ago, the world was pleasantly surprised by the announcement that the Rev. L. L. HILL, of Westkill, Greene County, N. Y., had mastered a secret which had baffled all inquisitive science up to that time, viz: the art of "Daguerreotyping in colors." It was stated in a communication by Mr. H. to a Journal specially devoted to Daguerrean art, that the only material obstacle to full success seemed to be the inability to reproduce the yellow tints of the original. Of course, so near an approach to complete discovery, which hundreds in this country and in Europe had been seeking without achieving anything made quite a sensation.*

It is proper to say here that the "Hillo-type" was the name given to the productions of Mr. H.'s process, by a Journal devoted to Daguerrean information. And it is but justice to say too, that Mr. H.'s discovery was not a stumble upon an unsought art, but that he had been earnestly engaged some two years in pursuit of the secret which burst upon him when he least looked for the revelation.

Mr. HILL, in the announcement as above, was an object of general attention, and especially so to Daguerreotypists generally. His secluded abode was overrun by visitors, and he was as suddenly overwhelmed by letters. There were some visitors and inquirers who had a rational curiosity to satisfy, but the major part were persons exercising the Daguerrean art mechanically, and anxious to gain the process, for the pecuniary gains which certainly follow its first exercise. The consequence was, that H. was almost deprived of the time to pursue his labor for the completion of his art, and annoyed beyond endurance by some of his sordid and prying visitors who stood upon no considerations of delicacy in pursuing their purpose. There were those, it is true, among visitors and correspondents, who were of a different mould, and who showed their

sympathy by proffers of aid in any desired shape. But Mr. Hill had a very natural and honorable desire to complete his discovery alone, and hence he was compelled to decline many kind offices of this class, though fully sensible of their worth.

His position at this time (one year ago) was peculiar. He labored alone. His means of support, as well as the funds for his large outlay for materials, were derived from the sale of a treatise on the Daguerrean art, forming a manual for the operator, added to something derived from the tuition of pupils. This was certainly not the most agreeable situation for an enthusiastic pursuit, but Mr. H. was satisfied. He pursued his studies with intensity, scarcely allowing himself time for sleep. He was compelled to fix stringent rules as to visitants, and warned by some very flagrant inquisitions, he was also forced to deny ordinary visitants a sight at his "Hillo-types."

At that time, (the summer of 1851,) Mr. Hill was sanguine of the completion of his discovery in a few weeks. Obstacles, however, prevented this, but his progress was such as to give him strong hope from day to day of a final success. In November, 1851, Westkill was invaded by a self-styled convention from a "State Daguerrean Association," whose proceedings may, possibly, be the subject of another notice. It is enough now to say, that the conduct of the master-spirit of the three inquisitors was such, that Mr. Hill declined showing them his plates, or giving them that satisfaction which was demanded as a right. This "Committee" published a report in a New York paper, signed by five names, though but three persons were at Mr. HILL's residence. The gist of the report was, that Mr. Hill had not only deluded others, but himself, and that the whole history of his alledged discovery "has been an unmitigated delusion." The "Committee," however, very contradictorily charged Mr. H. with making a profit of his alledged pretense—a charge, which it is plain, would rather militate against the after admission of his "delusion." They averred in fact, that from the sale of his books and tuition of pupils attracted by the fame of his discovery, he "realized a handsome income," and that this was the real object of Mr. HILL's announcement.

* One noted chemist in England, it is true, avows, that after years of research and experiment, he has succeeded in fixing upon the plate the image and tints of a green leaf, but acknowledges that this was only the case with a "green leaf," as he failed in producing any other color, or even a green tint from anything but a leaf.

This report—characterless, and bearing on its face the most sordid and narrow motives, did injure Mr. HILL materially. Where he was personally known it could do him no harm. But the first announcement of his discovery had injured the daguerrean business sensibly, and operators eagerly seized and circulated a denial which might avail their interests. The result was, Mr. H.'s treatise was no longer a source of revenue to him, and he was compelled, in self-vindication, to dismiss his pupils. But the worst effect was the sore blow given to a sensitive, nervous man, not very well hardened at best by contact with this bustling world, and unstrung by intense solitary labor and seclusion. Conscious of his rectitude of purpose, and the validity of his discovery, he was hurt by imputations of this sordid cast. He did however, sustained by personal friends knowing his integrity, and by artists able to certify to the truth of his productions, interpose a defence against this assault. But the mischief had been done in begetting a scepticism which those interested in it, knew how to turn to account. And though among those who came to his rescue he might include Professor Morse and other gentlemen, equally known as adepts in sciences, and of the most unquestioned integrity, yet the world looked on with indifference for the time, whilst Mr. HILL pursued his solitary struggle towards success.

During the whole of the pendency of Mr. HILL's discovery, the writer of this article has had the firmest faith in its actuality, based on a knowledge of Mr. H.'s science years ago, and the reports of reliable witnesses who had verified his pretenses by sight.

The "Committee report" was too transparent and common a newspaper "speculation" to impose upon any one experienced in the doublings of journalism, and it would have been a weak part indeed to have been imposed upon by such discrepencies.

— We would call particular attention to the prize offered by Mr. Anthony. This magnificent pitcher will be on exhibition at his store, No. 308 Broadway, New-York, early in October, and we shall give a fine engraving of it in our next issue. All our readers must be aware that Mr.

Anthony was one of the first who ever practiced the art in this country. We can remember when his and that of Mr. Butler were the only two rooms in the city of New-York. He took his first lessons of Professor Morse in 1839, and pursued the business up to July 1848, when he was obliged to relinquish it on account of ill health and establish his present business. On leaving the daguerreotype he did not leave behind him his love of the art, and his desire for its improvement, for improvement he was convinced is much needed. It is well known also that he has endeavored in many ways of late to advance its interests, and that last year, in furtherance of this object, he offered the liberal prize of five hundred dollars for the greatest improvement that might be made during the year 1851. Many were so illiberal that they accused him of putting forward this magnificent offer as a mere advertisement for his business, and, possibly, this narrow-minded view of the offer deterred our artists from laying claim to the prize, for it is a melancholy fact that but one claim was sent in, and this was not urged, on account, probably, of something similar having already appeared in Europe. However, as there was no competition there could be no award. Those who were deterred by the envious and narrow-minded, should now learn a lesson and become wise. Let no one, from an over sense of modesty, fail to make an attempt to secure the pitcher now offered. The decision is to be made by gentlemen whose integrity and judgment is unimpeachable, and the winner will reap a reward fully commensurate with the toil and trouble he may undergo. In good faith has this offer been made; let it be met in the same spirit.

— There is one subject which we wish to bring to the minds of our subscribers *particularly*. They cannot possibly be aware of the great injury done us by the

system of lending the Journal to non-subscribers, or they certainly would not do so. We find that, at a moderate computation, we have ten readers where we have one subscriber, and thus we are actually robbed of our just dues. The publication of a Journal of this kind is no easy matter, either pecuniarily or mentally, and the man who would meanly deprive us of five dollars, by filching our labor in this manner, has little title to the consideration of an honest man. It is thoughtlessness on the part of our subscribers, we have no doubt, in lending their copies, and we trust a second appeal to them of this nature will be unnecessary. When a penurious daguerreotypist requests the loan of your Journal, just insinuate to him in the most gentlemanly way possible, that if it is not worth subscribing and paying for, it is not worth having. One subscriber informed us that it was seldom he had an opportunity of reading one number until the next was issued, in consequence of its going the rounds of all his daguerrean neighbors, before he had himself seen it. He also informed us that it would frequently be taken from his rooms without even saying so much as by your leave, sir. If there are any daguerreans so poor that they cannot raise the price of subscription, and really desire the work, we will furnish it to them gratis if they will send us their names and address. The knowledge that there are such will be worth the price of subscription to us. In this case, however, we reserve the privilege of publishing the names of all such applicants, in case we find they have imposed upon our liberality. We can mention the names of several borrowers, but we submit this appeal to them before doing so.

— We understand that Mr. R. B. Appleby of Rochester, has made great improvements in his rooms, having enlarged them and put in a fine skylight, and added

largely to his collection of pictures, making his gallery one of the finest west of New-York. The excellence of this artist's pictures commands the attention of all lovers of the beautiful, and he is destined to receive more substantial recompense.

— The Messrs. Whitney & Denny of the same place, have also been improving and enlarging their gallery, and from the specimens of their work laid before us, we have no hesitation in saying that their pictures cannot be excelled. We bespeak for these two firms all the business worth contending for in this queen city of New-York.

— It will be remembered that Mr. McDonell, of Buffalo, presented the State Society with a full plate daguerreotype of the city of Buffalo. Several daguerreotypists who have seen this picture, inform us that it is one of the best ever produced by the daguerreotype process. We are happy to hear this, for Mr. McDonell is a gentleman whose efforts in the art deserve the highest commendation and most liberal support.

— A few days since a daguerrean friend of ours was called upon by a person who said his name was Heath, and after a brief general conversation, the latter said—

“Well, what do you think of the Hillo-type?”

“Not much,” was the reply. “Matters in regard to it have taken such a strange course, and there has been so many different statements, that I am more than half inclined to set it down as a humbug.”

“You are very much mistaken,” said H. “I am well acquainted with Mr. Hill, have seen his pictures, and they are truly to the life; nothing can be more perfect or beautiful.—I assure you they are all Mr. Hill claims for them. I have purchased the right for Rochester.”

“I have no right,” said our friend, “to

question the truth of what you say, particularly as you assert that you have seen the pictures, and you are the first person I have conversed with who has. I shall, therefore, take it for granted that what you say is correct, and as I have always been desirous of writing Mr. Hill on the subject, and of obtaining a right to some part of the country, I will now do so."

"I advise you to do so at once."

"I will set about it immediately."

"You cannot be too quick about it, but let me advise you also,—if you desire an *immediate* answer to your note—to enclose a five dollar bill in your letter; it will secure a prompt and favorable answer, for it is by such little attention that Mr. Hill is enabled to judge who are really his friends."

Now we give this conversation as nearly verbatim as possible; it may vary somewhat in words, but not a tittle in substance. We can vouch for the integrity of the narrator but we must doubt the authority of Mr. Heath to make such propositions in the name of Mr. Hill. Mr. Heath is totally a stranger to us, and we bear him no ill will, but we must say to him that he is certainly very injudicious to compromise Mr. Hill's character in this way

— The Morning Star, published at Houston, Texas, says:—"Some very fine pictures have lately been taken by Mr. J. H. S. Stanley, the daguerreotypist in our city. They are the results of experiments faithfully persevered in, until success has crowned the efforts. It is always pleasing to see perseverance meet with its reward; and we hope, in this instance, that Mr. Stanley will receive a full recompense for his untiring labors. Mr. Stanley, previous to his coming to our city, was an *amateur* artist. The portraits lately taken by him are pronounced, by those who have seen them, to be equal to any taken in the large cities of the North and South."

PREMIUM FOR THE BEST DAGUERREOTYPE.—One year since, I offered a reward of *five hundred dollars* for the greatest improvement that should be made in the Photographic art during the year 1851. No applications of any importance were made for it, probably in consequence of the natural modesty of inventors. Inasmuch, however, as the money has been offered, I consider that it no longer belongs to myself but to the Art. Therefore, with the advice and consent of Professors Renwick, Morse and Draper, who were appointed the judges in the matter, I have decided to invest the above amount in a MASSIVE SILVER PITCHER, of appropriate design, to be awarded as a prize for THE BEST LARGE DAGUERREOTYPE that shall be offered for competition previous to November 1st, 1853.

No competitor will be allowed to exhibit more than one Daguerreotype.

The Daguerreotype offered for competition must be on what is called the full size plate, $6\frac{1}{2} \times 8\frac{1}{2}$ inches.

Every competitor must be a member in good standing of some one of the various Photographic Societies.

A description of the method of operating in the production of the picture offered, must accompany each picture, mentioning the brand of plate and the makers of the various chemicals used, as far as the operator may be able to tell.

In order that there may be no complaint as to impartiality, the pictures must be sent anonymously, accompanied by a sealed package containing the name of the artist and the method of operating. The pictures and sealed envelopes will be marked with corresponding numbers in the order of their reception, and the latter will only be opened after the decision of the judges.

Artists of all countries are invited to send pictures for competition.

All letters of inquiry upon the subject will receive prompt attention, and it is earnestly hoped the competition will be as spirited as possible.

All who intend to compete for the prize should send in their names as early as possible, as lists of the competitors will from time to time be published.

The pictures must be forwarded to my address, free of expense. E. ANTHONY,
308 Broadway.

THE PHOTOGRAPHIC ART-JOURNAL.

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No. 2.

PHOTOGRAPHY.*

BY ROBERT HUNT.

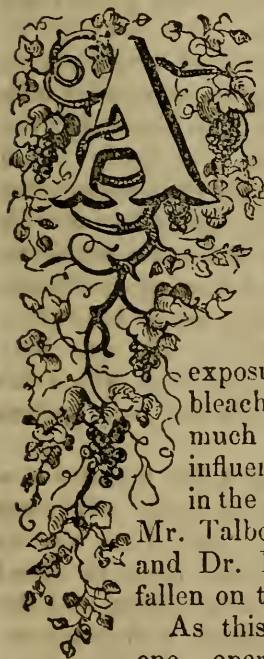
PROFESSOR OF MECHANICAL SCIENCE IN THE MUSEUM OF PRACTICAL GEOLOGY,

AUTHOR OF

"RESEARCHES ON LIGHT," "THE POETRY OF SCIENCE," ETC.

CHAPTER VIII.

ON THE PRODUCTION OF POSITIVE PHOTOGRAPHS BY THE USE OF THE HYDRIODIC SALTS.



A very short time after the publication of Mr. Talbot's processes, which I anxiously repeated with various modifications, I discovered a singular property in the hydriodate of potash of again whitening the paper darkened by exposure, and also, that the bleaching process was very much accelerated by the influence of light. Early in the year 1839, Lassaigne, Mr. Talbot, Sir John Herschel, and Dr. Fife, appear to have fallen on the same discovery.

As this process, giving by one operation pictures with their lights correct, is of much interest, I gave it for a very considerable time my undivided attention. The most extraordinary character of the hydriodic salt is, that a very slight difference in the strength of the solutions, in the composition of the photographic paper, or in the character of the incident light, produces totally opposite effects; in one case the paper is rapidly whitened, in the other a

deep blackness is produced almost as rapidly. Sometimes these opposing actions are in equilibrium, and then the paper continues for a long time perfectly insensible.

The uncertainty attending the application of these salts, arising from the above cause, has greatly circumscribed their use as photographic agents. However, I am inclined to hope these researches have reduced to certainty their somewhat inconstant effects, and rendered this method of producing photographs one of the most easy, as it is the most beautiful. That the various positions I wish to establish may be completely understood, and to ensure the same results in other hands, it will be necessary to enter into a somewhat detailed account of the various kinds of paper used, and to give tolerably full directions for successfully using them, either in the camera, or for drawings by application,—to examine attentively the effects of different organic and inorganic preparations on the paper, and to analyse the influence of the different rays upon it.

These particulars will be copied chiefly from my paper "On the Use of the Hydriodic Salts as Photographic Agents," published in the London and Edinburgh Philosophical Magazine for September and October, 1840, to which will be added the results of my experience since that time.

The variable texture of the finest kinds of paper occasioning irregularities of imbibition is a constant source of annoyance, deforming the drawings with dark patches, which are very difficult to remove; consequently my first endeavors were directed

* Continued from page 20, Vol. 4, No. 1.

to the formation of a surface on which the photographic preparations might be spread with perfect uniformity.

A variety of sizes were used with very uncertain results. Nearly all the animal glutens appear to possess a calorific property which may render them available in many of the negative processes; but they all seem to protect the darkened silver from the action of the hydriodic solutions. The gums are acted on by the nitrate of silver, and browned, independent of light, which browning considerably mars the effect of the finished picture. It is a singular fact, that the tragacanth and acacia gums render the drawings much less permanent. I therefore found it necessary for general practice to abandon the use of all sizes, except such as enter into the composition of the paper in the manufacture. It occurred to me that it might be possible to saturate the paper with a metallic solution, which should be of itself entirely uninfluenced by light on which the silver coating might be spread without suffering any material chemical change. The results being curious, and illustrative of some of the peculiarities of the hydriodic salts, it will be interesting to study a few of them.

SULPHATE AND MURIATE OF IRON.—These salts, when used in small proportions, appeared to overcome many of the first difficulties, but all the drawings on papers thus prepared faded out in the dark. If, after these photographs have faded entirely out, they are soaked for a short time in a solution of the ferrocyanate of potash, and then are exposed to the light, the picture is revived, but with reversed lights and shadows.

ACETATE AND NITRATE OF LEAD.—These salts have been much used by Sir John Herschel, both in the negative and positive processes, and, it appears, with considerable success. I found a tolerably good result when I used a *saturated* solution; but papers thus prepared required a stronger light than other kinds. When I used weaker solutions, the drawings were covered with black patches. On these a little further explanation is required. When the strong solution has been used, the hydriodic acid which has not been expended in forming the iodide of silver—which forms the lights of the picture—goes to form the iodide of lead. This iodide is soluble in

boiling water, and is easily removed from the paper. When the weaker solution of lead has been used, instead of the formation of an iodide, the hydriodate exerts one of its peculiar functions in producing an oxide of the metal.

MURIATE AND NITRATE OF COPPER.—These salts, in any quantities, render the action of the hydriodates very quick; and, when used in moderate proportions, they appeared to promise at first much assistance in quickening the process. I have obtained, with papers into the preparation of which nitrate of copper has entered, perfect camera views in ten minutes; but experience has proved their inapplicability, the edges of the parts in shadow being destroyed by chemical action.

CHLORIDES OF GOLD AND PLATINUM act similarly to each other. They remain inactive until the picture is formed, then a rapid oxidation of these metals takes place and all the bright parts of the picture are darkened.

An extensive variety of preparations, metallic, and non-metallic, were used with like effects, and I am convinced that the only plan of obtaining a perfectly equal surface, without impairing the sensitiveness of the paper, is careful manipulation with the ordinary muriates and silver solutions.

By attention to the following directions, simple in their character, but arrived at by a long series of enquiries, any one may prepare photographic papers on which the hydriodic solutions shall act with perfect uniformity:—

Soak the papers for a few minutes in a muriated wash, removing with a soft brush any air-bubbles which may form on it. The superfluous moisture must be wiped off with very clean cotton cloths, and the papers dried at common temperatures. When dry, the paper must be pinned out on a board, and the silver solution spread over it boldly but lightly, with a very soft sponge brush. It is to be *instantly* exposed to sunshine, and, if practicable, carried into the open air, as the more speedily evaporation proceeds, the less does the silver penetrate the paper, and the more delicate it is. The first surface is very irregular, being as before described, and represented in fig. 2. As soon as the surface appears dry, the silver solution must be again applied as before, and the exposure

repeated. It must now be exposed until a fine chocolate-brown color is produced equally on all parts of the surface, and then, until required for use, be carefully preserved from the influence of light. If the paper is to be kept long, the darkening must not be allowed to proceed so far as when it is to be speedily made use of.

In darkening these papers, the greatest possible attention must be paid to the quantity of light to which they are submitted, everything depending on the rapidity of the blackening process. The morning sun should be chosen, for the reasons before stated. A perfectly cloudless sky is of great advantage. The injurious consequence of a cloud obscuring the sun during the *last* darkening process, is the formation of a surface which has the appearance of being washed with a dirty brush. This is with difficulty removed by the hydriodates, and the resulting pictures want that clearness which constitutes their beauty. Papers darkened by the diffused light of a cloudy day, are scarcely, if at all, acted on by these salts. Great care must be taken to prevent the silver solution from flowing over the edges of the paper, as thereby an extra quantity of darkened silver is formed on both sides, which requires a long continued action of the hydriodates and light to bleach.

The kind of paper on which the silver is spread is an object of much importance. A paper known to stationers as satin post, double-glazed, bearing the mark of J. Whatman, Turkey Mill, is decidedly superior to every kind I have tried. The dark specks which abound in some sorts of paper must be avoided, and the spots made by flies very carefully guarded against. These are of small consequence during the darkening process, but when the hydriodic wash is applied, they form centres of chemical action, and the bleaching process goes on around them, independently of light, deforming the drawing with small rings, which are continually extending their diameters.

The saline washes may be considerably varied, and combined to an indefinite extent, with a continued change of effect, which is singularly interesting. In their application we should be guided, as in the negative process, by their combining proportions. The following list of the salts which will give the best effects, selected from upwards of seven hundred combinations, will show the variety of colors produced. They are placed in the order of the sensibleness they appear to maintain, when used as nearly as possible under the same circumstances.

Color of Picture.

MURIATE OF AMMONIA
CHLORIDE OF SODIUM
MURIATE OF STRONTIA
MURIATE OF BARYTA
SOL. CHLORIDE OF LIME
SOL. CHLORIDE OF SODA
IOIDE OF POTASSIUM
CHLORATE OF POTASH
PHOSPHATE OF SODA.
TARTRATE OF SODA
URATE OF SODA.
MURIATE OF IRON
BROMIDE OF SODIUM

Red, changing to black in the sunshine.
Ditto. ditto.
A fine brown.
A rich brown, inclining to purple.
Very red.
A brick red.
Yellowish brown.
Variable, sometimes yellowish, often a steel blue.
Mouse color.
Dark brown.
Yellowish brown.
Deep brown, which blackens.
Red brown, of a peculiarly rich tint.

The change mentioned in the color of the finished picture is that which arises from a fresh exposure to the solar rays; where no change is mentioned, it is too slight to be worth notice. This phenomenon will presently occupy our attention.

When papers with any of the above, except the phosphates, are soaked for a little time in water, and dried in the sunshine, the picture produced,—it matters not what

hydriodate is used, is rendered peculiarly red, and does not change by re-exposure. By washing some of the papers with weak solution of ammonia, this peculiarity is produced in a very striking manner.

THE SOLUTION OF SILVER.—Take of crystallized nitrate of silver 120 grains, distilled water 12 fluid drachms; when the salt is dissolved, add of alcohol 4 fluid drachms, which renders the solution

opaque; after a few hours a minute quantity of a dark powder, which appears to be an oxide of silver, is deposited, and must be separated by the filter. The addition of the alcohol to the solution was adopted from an observation I made of its influence in retarding the chemical action, which goes on in the shade, of the hydriodates on the salt of silver. Its use is therefore, to make the action depend more on *luminous influence*, than would be the case without it.

NITRIC ETHER.—The sweet spirits of nitre not only checks the bleaching process in the shade, but acts with the hydriodic salts to exalt the oxidation of the silver, or increase the blackness of it. In copying lace or any fine linear object, it is a very valuable agent, but it is useless for any other purposes, as all the faintly lighted parts are of the same tint.

HYDROCHLORIC ETHER, used as the solvent of the silver, and applied without any saline wash, has a similar property to the nitric ether; but as it is readily acted on by faint light, it is of greater value. However, papers prepared with it must be used within twenty-four hours, as after that they quickly lose their sensitiveness, and soon become nearly useless.

To fix with any degree of certainty the strength of the solution of the hydriodic salts which will in all cases produce the best effects, appears to me impossible; every variety of light to which it has been exposed to darken, requiring a solution of different specific gravity.

HYDRIODATES OF POTASH AND SODA.—The former of these salts being more easily procured than any other of the hydriodates, is the one generally employed. The strength of the solution of these salts best adapted for the general kinds of paper is thirty grains to an ounce of water. The following results will exhibit the different energies manifested by these solutions at several strengths, as tried on the same paper by the same light:—

120	grains of the salt to an ounce of	}	12 minutes.	
	water took to whiten the paper			
100	do. do. to do.		10	do.
80	do. do. to do.		9	do.
60	do. do. to do.		7	do.
40	do. do. to do.		6	do.
30	do. do. to do.		4	do.
20	do. do. to do.		6	do.
10	do. do. to do.		12	do.

The other hydriodic salts correspond nearly with these in their action; a certain point of dilution being necessary with all.

HYDRIODATE OF AMMONIA, if used on unsized paper, has some advantage as to quickness over the salts either of potash or soda. This preparation is, however, so readily decomposed, that the size of the paper occasions a liberation of iodine, and the consequent formation of yellow-brown spots.

HYDRIODATE OF IRON.—This metallic hydriodate acts with avidity on the darkened paper; but even in the shade its chemical energy is too great, destroying the sharpness of outline, and impairing the middle tints of the drawing. It also renders the paper very yellow.

HYDRIODATE OF MANGANESE answers remarkably well when it can be procured absolutely free of iron. When the manganesic solution contains iron, even in the smallest quantities, light and dark spots are formed over the picture, which gives it a curious speckled appearance.

HYDRIODATE OF BARYTA possesses advantages over every other *simple* hydriodic solution, both as regards quickness of action and the sharpness of outline. A solution may, however, be made still superior to it, by combining a portion of iron with it. Forty grains of the hydriodate of baryta being dissolved in one ounce of distilled water, five grains of very pure sulphate of iron should be added to it and allowed to dissolve slowly. Sulphate of baryta is precipitated, which should be separated by filtration, when the solution is composed of hydriodate of baryta and iron. By now adding a drop or two of diluted sulphuric acid, more baryta is precipitated, and a portion of hydriodic acid set free. The solution must be allowed to stand until it is clear, and then carefully decanted off from the sediment, as filtering paper decomposes the acid, and free iodine is liberated. By this means we procure a photographic solution of very active character. It should be prepared in small quantities, as it suffers decomposition under the influences of the atmosphere and light.

HYDRIODIC ACID, if used on paper which will not decompose its aqueous solution, which is rather difficult to find, acts very readily on the darkened silver. A portion of this acid free in any of the solu-

tions, most materially quickens the action. From the barytic solution it is always easy to set free the required portion, by precipitating the barytes by sulphuric acid. As the hydriodate of barytes is rarely kept by the retail chemist, it may be useful to give an easy method of preparing the solution of the required strength.

Put into a Florence flask one ounce of iodine, and cover it with one fluid ounce and a half of distilled water; to this add half a drachm of phosphorous cut into small pieces; apply a very gentle heat until they unite and the liquid becomes colorless; then add another fluid ounce and a half of water. It is now a solution of hydriodic acid and phosphoric acid. By adding carbonate of barytes to it, a phosphate of barytes is formed, which, being insoluble, falls to the bottom, whilst the soluble hydriodate of barytes remains dissolved. Make up the quantity of the solution to nine ounces with distilled water, and carefully preserve it in a green glass stoppered bottle.

For drawings by application, less care is required than for the camera-obscura. With a very soft flat brush apply the hydriodic solution on both sides of the prepared paper, until it appears equally absorbed; place in close contact with the object to be copied, and expose it to sunshine. The exposure should continue until the parts of the paper exposed to uninterrupted light, which first change to a pale yellow, are seen to *brown* a little. The observance of this simple rule will be found of very great advantage in practice. Immersion for a short time in soft water removes the brown hue, and renders the bright parts of the picture clearer than they would otherwise have been.

Engravings to be copied by this process—which they are most beautifully,—should be soaked in water and superimposed on the photographic papers, quite wet. If the paper is intended to be used in the camera, it is best to soak it in the hydriodic solution until a slight change is apparent, from chemical action on the silver; it is then to be stretched on a slight frame of wood, which is made to fit the camera, and not allowed to touch in any part but at the edges; placed in the dark chamber of the camera at the proper focus, and pointed to the object of which a copy is requir-

ed, which with good sunshine, is effected in about twenty minutes, varying of course with the degree of sensibility manifested by the paper. If the wetted paper is placed upon any porous body, it will be found, owing to the capillary communication established between different points, that the solution is removed from some parts to others, and different states of sensitiveness induced. Another advantage of the frame is, the paper being by the moisture rendered semi-transparent, the light penetrates and acts to a greater depth; thus cutting out fine lines which would otherwise be lost. However, if the camera is large, there is an objection to the frame; the solution is apt to gather into drops, and act intensely on small spots to the injury of the general effect. When using a large sheet, the safest course is to spread it out when wetted upon a piece of very clean *wet* glass, great care being taken that the paper and glass are in close contact. The picture is not formed so quickly when the glass is used, as when the paper is extended on a frame, owing to the evaporation being slightly retarded. The additional time required—about one sixth longer—is, in most cases, of little consequence.

The picture being formed by the influence of light, it is required, to render it unchangeable by any further action of the luminous fluid, not only that the hydriodic salt be entirely removed from the paper, but that the iodide of silver which is formed be also dissolved out of the drawing.

By well washing the drawing in warm water, the hydriodate is removed, and the pictures thus prepared have been stated to be permanent: and if they are kept in a portfolio, and only occasionally exposed, they are really so: for I shall show presently, that they have the property of *being restored in the dark, to the state in which they were prior to the destructive action of light*. A drawing which I executed in June 1839, which has often been exposed for days successively to the action of sunshine, and has altogether been very little cared for, continues to this date (April, 1851), as perfect as at first. These photographs will not, however, bear *long-continued* exposure without injury—about three months in summer, or six weeks in winter, being sufficient to destroy them. As this gradual decay involves some very

curious and interesting chemical phenomena, I shall make no excuse for dwelling on the subject a little.

The drawing fades first in the dark parts, and as they are perceived to lose their definedness, the lights are seen to darken, until at last the contrast between light and shadow is very weak.

If a dark paper is washed with an hydriodate and exposed to sunshine, it is first bleached, becoming yellow; then the light again darkens it. If, when quite dry, it is carefully kept from light, it will be found in a few days to be again restored to its original yellow color, which may be again darkened by exposure, and the yellow color be again restored in the dark. The sensitiveness to the influence of light diminishes after each exposure, but I have not been enabled to arrive at the point at which this entirely ceases. If a dark paper bleached by an hydriodate and light, be again darkened, and then placed in a bottle of water, the yellow is much more quickly restored, and bubbles of gas will escape freely which will be found to be oxygen. By enclosing pieces of hydriodated paper in a tube to darken, we discover, as might have been expected, some hydrogen is set free. If the paper is then well dried, and carefully shut up in a warm dry tube, it remains dark; moisten the tube or the paper, and the yellowness is speedily restored.

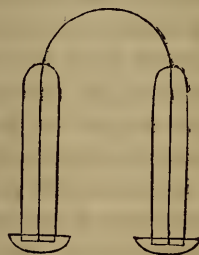
Take a photograph thus formed, and place it in a vessel of water, in a few days it will fade out, and bubbles of oxygen will gather around the sides. If the water is examined, there will be found no trace of either silver or iodine. Thus it is evident the action has been confined to the paper.

We see that the iodide of silver has the power of separating hydrogen from its combinations. I cannot regard this singular salt of silver as a definite compound: it appears to me to combine with iodine in uncertain proportions. In the process of darkening, the liberation of hydrogen is certain; but I have not in any one instance been enabled to detect iodine: of course it must exist, either in the darkened surface, or in combination with the unaffected under layer: possibly this may be the iodide of silver, with iodine in simple mixture, which, when light acts no longer on the preparation, is liberated, combines with

the hydrogen of that portion of moisture which the hygrometric nature of the paper is sure to furnish, and as an hydriodate again attacks the darkened surface, restoring thus the iodide of silver. This is strikingly illustrative of the fading of the photograph.

The picture is formed of iodide of silver in its light parts, and oxide of silver in its shadows. As the yellow salt darkens under the influence of light, it parts with its iodine, which immediately attacks the dark oxide, and gradually converts it into an iodide. The *modus operandi* of the restoration which takes place in the dark is not quite so apparent. It is possible that the active agent, LIGHT, being quiescent, the play of affinities comes undisturbed into operation; that the dark parts of the picture absorb oxygen from the atmosphere, and restore to the lighter portions the iodine it has before robbed them of. A series of experiments on the iodide of silver, in its pure state, will still more strikingly exhibit this very remarkable peculiarity.

Precipitate with any hydriodate, silver, from its nitrate in solution, and expose the vessel containing it, liquid and all, to sunshine, the exposed surfaces of the iodide will blacken: remove the vessel into the dark, and, *after a few hours*, all the blackness will have disappeared. We may thus continually restore and remove the blackness at pleasure. If we wash and then well dry the precipitate, it blackens with difficulty, and if kept quite dry, it continues dark; but moisten it, and the yellow is restored after a little time. In a watch-glass, or any capsule, place a little solution of silver; in another, some solution of any hydriodic salt; connect the two with a filament of cotton, and make up an electric circuit with a piece of platina wire: expose this little arrangement to the light, and it will be seen, in a very short time,



27.

that iodine is liberated in one vessel and

the yellow iodide of silver formed in the other, which blackens as quickly as it is formed.

Place a similar arrangement in the dark ; iodine is slowly liberated. *No iodide of silver is formed*, but around the wire a beautiful crystallization of metallic silver. Seal a piece of platina wire into two small glass tubes ; these, when filled, the one with hydriodate of potash in solution, and the other with a solution of the nitrate of silver, reverse into two watch-glasses, containing the same solutions ; the glasses being connected with a piece of cotton. An exposure during a few hours to daylight will occasion the hydriodic solution in the tube to become quite brown with liberated iodine : a small portion of the iodide of silver will form along the cotton, and at the end dipping in the salt of silver. During the night the hydriodic liquid will become again colorless and transparent, and the dark salt along the cotton will resume its native yellow hue.

From this it is evident that absolute permanence will not be given to these photographs until we succeed in removing from the paper all the iodide of silver formed. The hyposulphites dissolve iodide of silver ; therefore it might have been expected, *a priori*, they would have been successful on these drawings. If they are washed over with the hyposulphite of soda, and then quickly rinsed in plenty of cold water, the drawing is improved, but no better fixed than with cold water alone. If we persevere in using the hyposulphite, the iodide is darkened by combining with a portion of sulphur, and the lights become of a dingy yellow, which is not at all pleasant.

No plan of fixing will be found more efficacious with this variety of photographic drawings, than soaking them for some hours in cold water, and then well washing them in hot water.

It often happens that a picture, when taken from the camera, is less distinct than could be desired : it should not, however, be rejected on that account. All the details exist, although not visible. In many cases the soaking is sufficient to call them into sight : if they cannot be so evoked, a wash of weak ammonia or muriatic acid seldom fails to bring them up. Care, however, must be taken not to use these pre-

parations too strong, and the picture must be washed on the instant, to remove the acid or alkali.

One very singular property of these photographs is, that when first prepared, and after the washing, they are fixed or otherwise ; but when exposed to sunshine, they change in their dark parts from a red to a black. This peculiarity will be found by experiment to be entirely dependent on the influence of the red rays, or that portion of the sunbeam which appears to have the greatest heating power : hence regarded as the seat of greatest calorific power.

I have before mentioned the peculiar state of equilibrium in which the paper is when wetted with the hydriodate, and that a slight difference in the incident light will either bleach or blacken the same sheet. If four glasses, or colored fluids, be prepared, which admit respectively the blue, green, yellow and red rays, and we place them over an hydriodated paper, having an engraving superposed, it will be bleached under the influence of the blue light, and a perfect picture produced ; while, under the rays transmitted by the green glass, the drawing will be a negative one, the paper having assumed, in the parts which represent the lights, a very defined blackness. The yellow light, if pure, will produce the same effect, and the red light not only induces a like change, but occasions the dark parts of the engraving to be represented in strong lights : this last peculiarity is dependent on the heating rays, and opens a wide field for enquiry. My point now, however, is only to show that the darkening of the finished photograph is occasioned by the *least* refrangible rays of light ; whereas, its preparation is effected by the *most* refrangible.

I know not of any other process which shows, in a way at once so decided and beautiful, the wonderful constitution of every sunbeam which reaches us. Yet this is but one of numerous results of an analogous character, produced by these opposite powers, necessary to the constitution of that solar beam, which is poured over the earth, and effects those various changes which give to it diversified beauty, and renders it conducive to the well-being of animated creatures.

Before quitting this branch of art, it will

be interesting to examine the modifications which have been introduced by some continental enquirers.

M. Lassaigue, who has claimed priority in the use of the iodide of potassium, saturated his paper with a sub-chloride of silver which was allowed to assume a violet brown color, and it was then impregnated with the iodidated solution.

M. Bayard simply allowed ordinary letter paper, prepared according to Mr. Talbot's method, to blacken by light. He then steeped it for some seconds in a solution of iodide of potassium, and laying it on a slate, he placed it in the camera.

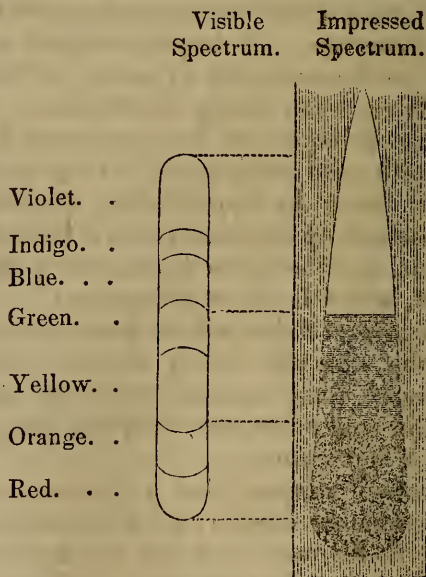
M. Verignon introduced a somewhat more complicated process. His directions are,—White paper should first be washed with water, acidulated by hydrochloric (muriatic) acid; then, after being well dried, steeped in the following solution:—Water fourteen parts, with one part of a compound formed of two parts of muriate of ammonia, two parts of bromide of sodium, and one of chloride and strontium. The paper dried again is passed into a very weak solution of nitrate of silver. There is thus formed, by double decomposition, a chloride and bromide of silver, which is made to turn black by exposing the paper to the light for about half an hour. To use this paper, it is steeped in a very weak solution of the iodide of sodium, and placed, quite wet, into the camera-obscura, at the proper focus. In fine weather, M. Verignon states, the effect is produced in twelve minutes. I have, however, never produced a good picture by this process in less than thirty minutes. A great objection to this mode of preparation is the very rapid deterioration of the paper: every day it will become less and less sensitive to light, and at the end of a fortnight it is useless.

The papers recommended for use in the former pages have the advantage of keeping well, provided ordinary care is taken with them. It is necessary to exclude them from the light—to keep them very dry—and, as much as possible, they should be protected from the action of the air. I have kept papers, prepared with the muriate of ammonia, baryta, and strontia, for twelve months, and have found them but very little impaired.

Dr. Schafhaeutl allows paper prepared in the way mentioned at a former page to

darken in a bright sun light. It is then macerated for at least half an hour, in a liquid prepared by mixing one part of the already described acid nitrate of mercury, with nine or ten parts of alcohol. A bright lemon yellow precipitate of basic hyponitrate of the protoxide of quicksilver falls, and the clear liquor is preserved for use. The macerated paper is removed from the alcoholic solution, and quickly drawn over the surface of diluted muriatic acid (one part strong acid to seven or ten of water), then quickly washed in water, and slightly and carefully dried at a heat not exceeding 212° of Fahr. The paper is now ready for being bleached by the rays of the sun; and, in order to fix the drawing, nothing more is required than to steep the paper a few minutes in alcohol, which dissolves the free bichloride of mercury. I must confess however, that in my hands the process has not been so successful as it is described to have been by the author of it.

It is perhaps necessary to remark, that we cannot multiply designs from an original hydriodated photograph. The yellow color of the paper is of itself fatal to transfers, and independently of this, the wet hydriodic solution would immediately destroy any superposed photograph.



28.

We have seen in a former chapter that the white photographic papers are darkened by the blue, indigo, and violet rays. On the dark papers washed with the hydriodic salts in solution, the bleaching is effected most energetically by the violet rays: it

proceeds with lessening intensity to the blue, while all the rays below the yellow have a darkening influence on the paper. This effect will be best illustrated by figure 28, in which is shown—somewhat exaggerated for the sake of distinctness—the very remarkable action which takes place; clearly establishing the fact first noticed by Wollaston, that the two extremities of the spectrum have different powers. This subject will be again the object of consideration.

The remarkable manner in which the point of greatest intensity is shifted from the blue to the violet, when papers have but a very slight difference in their composition or mode of preparation, is an extremely curious point of philosophical inquiry. It will be evident from what has been said, that it is necessary that the focus of the violet rays should be always chosen in using the hydriodated papers in the camera.

CHAPTER IX.

THE PROCESSES OF MR. H. FOX TALBOT, AND MODIFICATIONS.

The earliest productions of Mr. Talbot were simply such preparations as those already described, in which a chloride of silver was formed on the surface of the paper and some nitrate of silver in excess. These need not be any further described than they have already been. Those desirous of studying the history of the progress of the art, are referred to the original communications.*

Early in 1840, drawings on paper were handed about in the scientific circles of London and Paris, which were a great advance upon anything which had been previously done. These were the results of the calotype process of Mr. Talbot, and then attracted so much attention, that M. Biot made them the subject of a communication to the Academy of Sciences in Paris, and his remarks are printed *in extenso* in the *Comptes Rendus*, from which the following passages are translated.

Many of the remarks have a peculiar value, from the suggestions they contain, and they are worthy of record as marking

the period when the French were first made acquainted with the processes on paper, as practised in England, as some disposition has been shown on the part of some continental photographers to claim originality for processes published in England many years before their own were devised, and which singularly resemble them. After remarking that many very important physical facts were being developed by the study of photography, M. Biot continues:—

It is not to be expected that photogenic drawing, made on paper, can equal the clearness and fineness of those obtained on level and polished metallic plates. The texture of paper, its superficial roughnesses, the depth of the imbibitions, and the capillary communication established between the various unequally marked parts of its surface, are so many obstacles to absolute strictness of delineation, as well as to the regular gradation of tints in the camera obscura; and the influence of these obstacles is greater when the chemical operation is slowly carried on. But when there is no pretence or necessity for submitting to the delicacies of art—when it is required, for example, to copy rare manuscripts faithfully—if we have papers which are very susceptible of receiving impressions in the camera obscura, they will suffice perfectly; particularly when they present, like those of Mr. Talbot, the facility of immediately procuring copies of the primitive drawing. It will therefore, doubtless, be found more commodious, and often even more practicable, to put four or five hundred drawings in a portfolio, than to carry about a similar provision of metallic plates with those indispensable protectors, squares of glass, to cover them,—perfect prints, it is true, but which are as light as the vapor from which they are produced; and, indeed, to bring the voluminous collection of these fragile products through the accidents incident to long, difficult and sometimes perilous voyages. Attempts are being made, at this time, to fix the images produced by the daguerrotype. But whoever has attentively studied the combination of physical conditions whence these admirable images result, will find it very difficult,—I am far from saying impossible,—to fix them without destroying, or at least without essentially altering, the causes which produce their charm: and then, for the purposes

* London and Edinburgh Philosophical Magazine, March 1839.

which I have mentioned, papers very susceptible of impression would still have the advantages of a less troublesome removal from place to place, as also of more easy preservation.

The utility of sensible papers for copying texts was a natural consequence of the clearness of the copies of engravings which Mr. Talbot had already obtained by application, and which were presented to the academy. He has included others among those just sent: there are also added specimens of this special application, consisting of copies of a Hebrew psalm, of a Persian Gazette, and of an old Latin chart of the year 1279. Our brethren of the *Académie des Belles Lettres*, to whom I exhibited these impressions, were pleased to mark the fidelity of the characters, and clearness, by which they are rendered as legible as the original text. Doubtless an old manuscript may be copied more quickly and more accurately by this means than by hand, even when the language in which it is written is understood. However, we must stop here. These copies are obtained by application: we must be enabled to obtain them by immediate radiation in the camera-obscura. It is the only means of extending the process to papyrus and other manuscripts, or which are not sufficiently transparent for radiation to traverse them. Moreover, the application of leaves is very difficult when they are bound up in a volume, and cannot be detached from one another.

But this important extension will require much physical perfecting, towards which experimenters should direct their efforts. The first thing will be to augment the sensibility of the paper as much as possible, in order that the capillary communication of its various parts may not have sufficient time to deteriorate the effects of the local and immediate action of the radiation. I should be led to believe that it is principally to this kind of communication should be attributed the fact remarked by Mr. Talbot, that, in experiments by application, it is more difficult to copy clearly a tissue of black lace spread on a white ground, than white lace on a black ground; two cases of which he here gives examples. But another more hidden and more general difficulty seems to me to proceed from the equal faculty of various substances,

for reflecting the radiations which strike them, and perhaps from their aptitude for making them undergo physical modifications. For example, you wish to copy by radiation in the camera-obscura a picture painted on canvas, wood, or porcelain: the different coloring substances employed by the painter are placed and distributed in such a manner that each of them absorbs certain portions of total incident light, and reflects especially towards your eye the complementary portions, wherein predominate the rays proper to form the tint of which it would give you the sensation. But the chemically active reaction which the same parts of the picture receive and reflect is distinct from the light which effects your retina. In order that the chemical effect which it produces on the sensible paper, or on M. Daguerre's layer of iodine, may present in light, or in shade, the equivalent of the colored shades, it is requisite—1st, that this reflected radiation be chemically active; 2d, that the energy of its action be proportional to the intensity of illumination operated in the eye by the portion of luminous radiation reflected from the same point of the picture. Now this latter concordance certainly should not be fulfilled in an equal degree by the various coloring matters, which affect the eye in the same manner, and which the painter may substitute for one another in his work. Substances of the tint may present, in the quantity, or the nature of the invisible radiations which they reflect, as many diversities, or diversities of the same order, as substances of a different tint present relative to light: inversely they may be similar in their property of reflecting chemical radiations, when they are dissimilar to the eye: so that the differences of tint which they presented in the picture made for the eye will disappear in the chemical picture, and will be confused in it in a shade, or an uniform whiteness. These are the difficulties generally inherent in the formation of chemical pictures; and they show, I think, evidently, the illusion of the experimenters who hope to reconcile, not only the intensity, but the tints of the chemical impressions produced by radiations, with the colors of the objects from which these radiations emanate. However, the distant or near relations of these two species of phenomena are very curious to study, not

only as regards the photogenic art, since that name has, very improperly, been given it, but likewise as regards experimental physics. I doubt not that examples may be remarked in the images of natural objects and colored pictures executed by the daguerreotype; but very apparent ones may be seen among Mr. Talbot's present impressions. Thus, some of them represent white porcelain vases, colored shells, a candlestick (of metal) with its taper, a foot of white hyacinths. The whole of these objects are felt and perceived very well in their chemical image; but the parts which reflect the purely white light, probably also the radiations of every kind, are relatively to the others, in an exaggerated proportion of illumination, which, it seems to me, must result, partially, from the capillary communication during the continuance of the action; so that the inequality would be less if the paper were more sensible or more rapidly acted on. In the hyacinth, the stalk and the green leaves produced scarcely a faint trace of their configuration; and they produced it especially in the parts of the outline, where more or less perfect specular reflection is operated. The points of the candlestick (metallic) where this reflection occurred, are copied by white stains locally applied, and which deteriorate the effect of the whole by their disproportion. But this is seen especially in a picture by Correggio, the frame of which was very vividly copied, whilst the figure on the canvas was hardly perceptible. This disproportion of lustre in the reproduction of some white parts, especially when they are dull and consequently very radiating, is sensible in certain parts of views taken by Mr. Talbot, to the point of rendering difficult the interpretation of the object to which they belong. However, these views are very satisfactory, as being obtained on paper in the present season. Moreover, by an advantage peculiar to the chemical preparation which Mr. Talbot uses, it appears that operations once completed, the drawings are no longer alterable by radiation, even acting with much energy. Indeed, we have as an example, four proofs of the same view of Mr. Talbot's house, with an identical disposition of lights and shades: so that some, at least, if not three out of four, must have been procured by super-

position. Mr. Talbot is right in representing this property of reproduction as an especial advantage of his process, and it would indeed be very useful in voyages. I have exposed one of these drawings to the action of the sun, not very powerful. It is true, for several hours, and I have not perceived the slightest alteration in the lights. I think I understand that, in Mr. Talbot's opinion, the shades alone are strengthened under this influence. According to what I have just said, it should be expected that the triumph of this process, as of every other photogenic reproduction, would take place with objects of white and dull plaster. Indeed, Mr. Talbot's parcel contains eight copies of busts and statues; six of which chiefly, of various forms and sizes, present very remarkable results, especially taking into consideration the unfavorable season at which they were produced. Truly, there is not found in them the strict perfection of trace, nor the admirable gradation of lights and shades, which constitutes the charm of M. Daguerre's impressions; and I again repeat it, that my expressions may not be exaggerated. But I also repeat, that representations on sensible papers must be considered as principally applicable to a different object, which does not impose such strict conditions of art, requiring only faithful images, sufficiently clear in their details to be readily recognised, and which, moreover, being obtained with rapidity, by an easy manipulation, may be kept with very little care, comprised in great number in a small compass; and removed from place to place with facility. Mr. Talbot's papers already present many of these essential qualities, with the advantage of being able to furnish numerous copies immediately. His efforts, and those of others occupied with the same subject, will conclude by adding to them everything which may be desirable, provided that expectation, or the pretension of a perfection of art physically incompatible with operations on paper, do not give a false direction to their endeavors. However, not to appear to despair too much of the future, I may add that the height of success would consist in discovering a substance very susceptible of receiving impressions, which might be applied on a papyraceous leaf without penetrating deep into it, and which might, however, be fixed

in it after the operation, as in Mr. Talbot's impressions. It does not seem necessary even that the first impression thus rapidly obtained should copy the lights and shades in their proper places, provided that its transparency and fixedness were such, that we might deduce them from the application of copies wherein the inversion would be corrected. And perhaps, by this decomposition of the problem into two successive operations, one of the best ways is opened by which it may be resolved.

There are but a few points on which M. Biot has touched but which have been found to be substantially true. Numerous improvements have been introduced, but still physical difficulties, such as those which he has indicated, surround the photographic processes.

Mr. Talbot's description of his process, the patent for which is dated 1842, is as follows:—

Take a sheet of the best writing-paper, having a smooth surface, and a close and even texture. The water-mark, if any, should be cut off, lest it should injure the appearance of the picture. Dissolve 100 grains of crystallized nitrate of silver in six ounces of distilled water. Wash the paper with this solution with a soft brush on one side, and put a mark on that side, whereby to know it again. Dry the paper cautiously at a distance from the fire, or else let it dry spontaneously in a dark room. When dry or nearly so, dip it into a solution of iodide of potassium, containing 500 grains of that salt dissolved in one pint of water, and let it stay two or three minutes in the solution. Then dip the paper into a vessel of water, dry it lightly with blotting-paper, and finish drying it at a fire, which will not injure it even if held pretty near; or else it may be left to dry spontaneously. All this is best done in the evening by candlelight: the paper, so far prepared, is called *iodized paper*, because it has a uniform pale-yellow coating of iodide of silver. It is scarcely sensitive to light, but nevertheless it ought to be kept in a portfolio or drawer until wanted for use. It may be kept for any length of time without spoiling or undergoing any change, if protected from sunshine. When the paper is required for use, take a sheet of it, and wash it with a liquid prepared in the following manner:—

Dissolve 100 grains of crystallized ni-

trate of silver in two ounces of distilled water; add to this solution one-sixth of its volume of strong acetic acid. Let this be called mixture A.

Make a saturated solution of crystallized gallic acid in cold distilled water. The quantity dissolved is very small. Call this solution B.

Mix together the liquids A and B in equal volumes, but only a small quantity of them at a time, because the mixture does not keep long without spoiling. This mixture Mr. Talbot calls the *gallo-nitrate of silver*. This solution must be washed over the iodized paper on the side marked, and, being allowed to remain upon it for half a minute, it must be dipped into water and then lightly dried with blotting-paper. This operation in particular requires the total exclusion of daylight; and although the paper thus prepared has been found to keep for two or three months, it is advisable to use it within a few hours, as it is often rendered useless by spontaneous change in the dark.

Paper thus prepared is exquisitely sensitive to light; an exposure of less than a second to diffused daylight being quite sufficient to set up the process of change. If a piece of this paper is partly covered, and the other exposed to daylight for the *briefest possible period of time*, a very decided impression will be made. This impression is latent and invisible. If, however, the paper be placed aside in the dark, it will gradually *develop itself*; or it may be brought out immediately by being washed over with the gallo-nitrate of silver, and held at a short distance from the fire, by which the exposed portions become brown, the covered parts remaining of their original color.

The pictures being thus procured, are to be fixed by washing in clean water, and lightly drying between blotting paper, after which they are to be washed over with a solution of bromide of potassium, containing 100 grains of that salt, dissolved in eight or ten ounces of water; after a minute or two, it is again to be dipped into water, and then finally dried.

Such was, in all its main features, the description given by Mr. Talbot in his specification of his process for producing the calotype, or *beautiful picture*; he in a second patent included the following points:

1. Removing the yellowish tint, which is occasioned by the iodide of silver, from the paper, by plunging it into a hot bath of hyposulphite of soda dissolved in ten times its weight of water, and heated nearly to the boiling point. The picture should remain in the bath about ten minutes, and be then washed in warm water and dried.

Although this has been included by Mr. Talbot in his specification, he has clearly no claim to it, since in February 1840 Sir John Herschel published, in his Memoir "On the Chemical Action of the Rays of the Solar Spectrum," a process of fixing with the *hot* hyposulphite of soda.

After undergoing the operation of fixing, the picture is placed upon a hot iron, and wax melted into the pores of the paper to increase its transparency.

2. The calotype paper is rendered more sensitive by placing a warm iron behind it in the camera whilst the light is acting upon it.

3. The preparation of *io-gallic paper*, which is simply washing a sheet of iodized paper with gallic acid. In this state it will keep in a portfolio, and is rendered sensitive to light by washing it over with a solution of nitrate of silver.

4. Iodized paper is washed with a mixture of twenty-six parts of a saturated solution of galic acid to one part of the solution of nitrate of silver ordinarily used. It can then be dried without fear of spoiling, may be kept a little time, and used without further preparation.

5. The improvement of photographic drawings by exposing them twice the usual time to the action of sunlight. The shadows are thus rendered too dark, and the lights are not sufficiently white. The drawing is then washed, and plunged into a bath of iodide of potassium, of the strength of 500 grains to each pint of water, and allowed to remain in it for one or two minutes, which makes the pictures brighter, and its lights assume a pale-yellow tint. After this, it is washed, and immersed in a hot bath of hyposulphite of soda until the pale yellow tint is removed, and the lights remain quite white. The pictures thus finished have a pleasing and peculiar effect.

6. The appearance of photographic pictures is improved by waxing them, and placing white or colored paper behind them.

7. Enlarged copies of daguerreotypes and calotypes can be obtained by throwing magnified images of them, by means of lenses, upon calotype paper.

8. Photographic printing. A few pages of letterpress are printed on one side only of a sheet of paper, which is waxed if thought necessary, and the letters are cut out and sorted: then, in order to compose a new page, a sheet of white paper is ruled with straight lines, and the words are formed for cementing the separate letters in their proper order along the lines. A negative photographic copy is then taken, having white letters on a black ground; this is fixed, and any number of positive copies can be obtained. Another method proposed by the patentee, is to take a copy by the camera-obscura from large letters painted on a white board.

9. Photographic publication. This claim of the patentee consists in making, first, good negative drawings on papers prepared with salt and ammonio nitrate of silver; secondly, fixing them by the process above described; thirdly, the formation of positive drawings from the negative copy, and fixing.

These claims are taken from the specification as published in the Repertory of Patent Inventions. Another patent has been obtained by Mr. Talbot, but as this belongs peculiarly to the use of porcelain, the notice of it must be referred to another section.

The first important published improvement on the calotype was due to Mr. Cundell, whose process was published in the Philosophical Magazine for May 1841, from which we extract the following:—

1. To produce a calotype picture, there are five distinct processes, all of which, except the third, must be performed by candle light: they are all very simple, but, at the same time, they all require care and caution. The first and not the least important is—

2. THE IODIZING OF THE PAPER.—Much depends upon the paper selected for the purpose; it must be of a compact and uniform texture, smooth and transparent, and of not less than medium thickness. The best I have met with is a fine satin post paper, made by "R. Turner, Chafford Mill." Having selected a half sheet without flaw, or watermark, and free from even

the minutest black specks, the object is to spread over its surface a perfectly uniform coating of the iodide of silver, by the mutual decomposition of two salts, nitrate of silver and iodide of potassium. There is a considerable latitude in the degree of solution in which these salts may be used, and also in the manner and order of their application, but as the thickness and regularity of the coating depend upon the solution of nitrate of silver, and upon the manner in which it is applied, I think it ought by all means to be applied first, before the surface of the paper is disturbed. I use a solution of the strength of seventeen grains to the ounce of distilled water.

3. The paper may be pinned by its two upper corners to a clean dry board a little larger than itself; and, holding this nearly upright in the left hand, and commencing at the top, apply a wash of the nitrate of silver *thoroughly, evenly and smoothly*, with a large soft brush, taking care that every part of the surface be thoroughly wetted and that nothing remain unabsorbed in the nature of free and running solution. Let the paper now hang loose from the board into the air to dry, and by using several boards time will be saved.

4. The nitrate of silver spread upon the paper is now to be saturated with iodine, by bringing it in contact with a solution of the iodide of potassium; the iodide goes to the silver, and the nitric acid to the potash.

5. Take a solution of the iodide of potassium of the strength of 400 grains to a pint of water, to which it is an improvement, analogous to that of M. Claudet in the daguerreotype, to add 100 grains of common salt. He found that the chlorinated iodide of silver is infinitely more sensitive than the simple iodide; and by this addition of common salt, a similar, though a less remarkable, modification is obtained of the sensitive compound. Pour the solution into a shallow flat-bottomed dish, sufficiently large to admit the paper, and let the bottom of the vessel be covered to the depth of an eighth of an inch. The prepared side of the paper having been previously marked, is to be brought in contact with the surface of the solution, and, as it is desirable to keep the other side clean and dry, it will be found convenient, before putting it in the iodine, to fold upwards a

narrow margin along the two opposite edges. Holding by the upturned margin, the paper is to be gently drawn along the surface of the liquid until its lower face be thoroughly wetted on every part; it will become plastic, and in that state may be suffered to repose for a few moments in contact with the liquid; it ought not, however, to be exposed in the iodine dish for more than a minute altogether, as the new compound, just formed upon the paper, upon further exposure, would gradually be re-dissolved. The paper is therefore to be removed, and, after dripping, it may be placed upon a clean surface with the wet side uppermost until about half dry, by which time the iodine solution will have thoroughly penetrated the paper, and have found out and saturated every particle of the silver, which it is quite indispensable it should do, as the smallest portion of undecomposed nitrate of silver would become a black stain in a subsequent part of the process.

6. The paper is now covered with a coating of the iodide of silver; but it is also covered, and indeed saturated, with saltpetre and the iodide of potassium, both of which it is indispensable should be completely removed. To effect the removal of these salts, it is by no means sufficient to "dip the paper in water;" neither is it a good plan to wash the paper with any considerable motion, as the iodide of silver, having but little adhesion to it, is apt to be washed off. But the margin of the paper being still upturned, and the unprepared side of it kept dry, it will be found that by setting it afloat on a dish of clean water, and allowing it to remain five or ten minutes, drawing it gently now and then along the surface to assist in removing the soluble salts, these will separate by their own gravity, and (the iodide of silver being insoluble in water) nothing will remain upon the paper but a beautifully perfect coating of the kind required.

7. The paper is now to be dried; but while wet, do not on any account touch or disturb the prepared surface with blotting-paper, or with anything else. Let it merely be suspended in the air, and in the absence of a better expedient, it may be pinned across a string by one of its corners. When dry, it may be smoothed by pressure. It is now "iodized" and ready for use, and

in this state it will keep for any length of time if protected from the light. The second process is that of exciting, or

8. PREPARING THE PAPER FOR THE CAMERA.—For this purpose are required the two solutions described by Mr. Talbot; namely a saturated solution of crystallized gallic acid in cold distilled water, and a solution of the nitrate of silver of the strength of 50 grains to the ounce of distilled water, to which is added one-sixth part of its volume of glacial acetic acid. For many purposes these solutions are unnecessarily strong, and unless skillfully handled, they are apt to stain or embrown the paper; where extreme sensitiveness, therefore, is not required, they may with advantage be diluted to half the strength, in which state they are more manageable and nearly as effective. The gallic acid solution will not keep for more than a few days, and only a small quantity, therefore, should be prepared at a time. When these solutions are about to be applied to the iodized paper, they are to be mixed together, in equal volumes, by means of a graduated diachm tube. This mixture is called “the gallo-nitrate of silver.” As it speedily changes, and will not keep for more than a few minutes, it must be used without delay, and it ought not to be prepared until the operator is quite ready to apply it.

9. The application of this “gallo-nitrate” to the paper is a matter of some nicety. It will be found best to apply it in the following manner:—Pour out the solution upon a clean slab of plate-glass, diffusing it over the surface to a size corresponding to that of the paper. Holding the paper by a narrow upturned margin, the sensitive side is to be applied to the liquid upon the slab, and brought in contact with it by passing the fingers gently over the back of the paper, which must not be touched with the solution.

10. As soon as the paper is *wetted* with the gallo-nitrate, it ought instantly to be removed into a dish of water; five or ten seconds at the most is as long as it is safe at this stage to leave the paper to be acted upon by the gallo-nitrate; in that space of time it absorbs sufficient to render it exquisitely sensitive. The excess of gallo-nitrate must immediately be washed off by drawing the paper gently several times

under the surface of the water which must be perfectly clean; and being thus washed it is finished by drawing it through fresh water, two or three times, once more. It is now to be dried in the dark, in the manner described in § 7, and when surface dry it may either be placed, while still damp, in the camera, or in a portfolio, among blotting-paper, for use. If properly prepared, it will keep perfectly well for four-and-twenty hours at least, preserving all its whiteness and sensibility.

11. The light of a single candle will not injure the paper at a moderate distance; but the less the paper, or the exciting solution, is unnecessarily exposed, even to a feeble candle light, the better. Common river or spring-water answers perfectly to *wash* the paper, distilled water being required for the silver solutions only.

Stains of “gallo-nitrate,” while recent, may be removed from the fingers by a little strong ammonia, or by the cyanide of potassium.

The third process is that of

12. THE EXPOSURE IN THE CAMERA, for which, as the operator must be guided by his own judgment, few directions can be given, and few are required. He must choose or design his own subject; he must determine upon the aperture to be used, and judge of time required, which will vary from a few seconds to three or four minutes, the subject ought, if possible, to have a strong and decided effect; but extreme lights, or light-colored bodies, in masses, are by all means to be avoided. When the paper is taken from the camera, very little, or more commonly no trace whatever, of a picture is visible until it has been subjected to the fourth process, which is

13. THE BRINGING OUT OF THE PICTURE, which is effected by again applying the “gallo-nitrate” in the manner directed in § 9. As soon as the paper is wetted all over, unless the picture appear immediately it is to be exposed to the radiant heat from an iron, or any similar body, held within an inch or two by an assistant. It ought to be held vertically, as well as the paper; and the latter ought to be moved, so as to prevent any one part of it becoming dry before the rest.

As soon as the picture is sufficiently brought out, wash it immediately in clean

water to remove the gallo-nitrate, as directed in § 10; it may then be placed in a dish by itself, *under* water, until you are ready to fix it. The most perfect pictures are those which "come out" before any part of the paper becomes dry, which they will do if sufficiently impressed in the camera. If the paper be allowed to dry before washing off the gallo-nitrate, the lights sink and become opaque; and if exposed in the dry state to heat, the paper will embrown; the drying, therefore, ought to be *retarded*, by wetting the back of the paper, or the picture may be brought out by the vapor from hot water, or, what is better, a horizontal jet of steam. The fifth and last process is

14. THE FIXING OF THE PICTURE, which is accomplished by removing the sensitive matter from the paper. The picture, or as many of them as may be, is to be soaked in warm water, but not warmer than may be borne by the finger; this water is to be changed once or twice, and the pictures are then to be well drained, and either dried altogether, or pressed in clean and dry blotting-paper, to prepare them to imbibe a solution of the hyposulphite of soda, which may be made by dissolving an ounce of that salt in a quart (forty ounces) of water. Having poured a little of the solution into a flat dish, the pictures are to be introduced into it one by one; daylight will not now injure them; let them soak for two or three minutes, or even longer if strongly printed, turning and moving them occasionally. The remaining unreduced salts of silver are thus thoroughly dissolved, and may now, with the hyposulphite, be entirely removed by soaking in water and *pressing* in clean white blotting-paper alternately: but if time can be allowed, soaking in water alone will have the effect in twelve or twenty-four hours, according to the thickness of the paper. It is essential to the success of the fixing process, that the paper be in the first place thoroughly penetrated by the hyposulphite, and the sensitive matter dissolved; and next, that the hyposulphite compounds be effectually removed. Unless these salts are completely removed, they induce a destructive change upon the picture, they become opaque in the tissue of the paper, and entirely unfit it for the next, which is

15. THE PRINTING PROCESS.—The pic-

ture being thus fixed, it has merely to be dried and smoothed, when it will undergo no further change. It is, however, a *negative* picture, and if it have cost some trouble to produce it, that trouble ought not to be grudged, considering that you are now possessed of a matrix which is capable of yielding a vast number of beautiful impressions. I have had as many as fifty printed from one, and I have no doubt that as many more might be obtained from it.

16. The manner of obtaining these impressions has been so often described, and there are so many different modes of proceeding, that it may be sufficient to notice very briefly the best process with which I am acquainted. Photography is indebted for it to Alfred Taylor. His solution is made by dissolving one part of nitrate of silver in twelve of distilled water and gradually adding strong liquid ammonia until the precipitate at first produced is at length *just* re-dissolved.

17. Some paper is to be met with, containing traces of bleaching chlorides, which does not require any previous preparation; but in general, it will be found necessary to prepare the paper by slightly impregnating it with a minute quantity of common salt. This may be done by dipping it in a solution in which the salt can barely be tasted, or of the strength of from thirty to forty grains to a pint of water. The paper, after being pressed in clean blotting-paper, has merely to be dried and smoothed, when it will be fit for use.

18. The ammonio-nitrate of silver is applied to the paper in the manner described in § 3; and when perfectly dry, the negative picture to be copied is to be applied to it, with its face in contact with the sensitive side. The back of the negative picture being uppermost, they are to be pressed into close contact by means of a plate of glass; and, thus secured, they are to be exposed to the light of the sun and sky. The exposed parts of the sensitive paper, will speedily change to lilac, slate-blue, deepening towards black; and the light, gradually penetrating through the semi-transparent negative picture, will imprint upon the sensitive paper beneath a *positive* impression. The negative picture, or matrix, being slightly tacked to the sensitive paper by two mere particles of wafer, the progress of the operation may from time

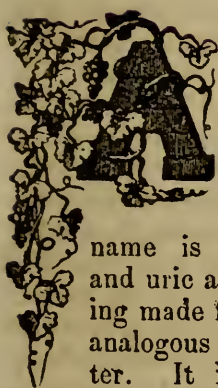
to time be observed, and stopped at the moment when the picture is finished.

19. It ought then, as soon as possible,

to be soaked in warm water, and fixed in the manner described in § 14.

TO BE CONTINUED.

ON ACIDS. II.—ANIMAL ACIDS.*



ALLANTURIC ACID.—A nitro-geneous acid, discovered by Pelouze, and produced by the action of nitric acid on *allanturin*, a substance prepared from the allantoric fluid of the cow. The name is derived from allantoric and uric acid, the new compound being made from the former, and being analogous in composition to the latter. It is prepared by dissolving allanturin in nitric acid with a gentle heat—1.2 parts of the former to 1.4 of the latter. When the solution is cool, pour it from the crystals of nitrate of urea which have been deposited, evaporate and dry at 80°F. Heat the residuum with weak water of ammonia, and add alcohol; then collect the white viscid matter thrown down, redissolve it in water, and again precipitate it with alcohol. This last precipitate is the acid.

BUTYRIC ACID.—This was first obtained from butter by Chevreul. It is principally prepared from the butyrate of baryta or magnesia, by adding a little sulphuric acid, taking care not to get so much as to decompose the whole of the salt. Then filter and distill the clear liquor, when the product will be butyric acid, from which the water may be removed by chloride of calcium.

FORMIC ACID is composed of two parts carbon, one hydrogen, and one of oxygen. It is a natural product obtained by infusing ants in a small quantity of water, and submitting them to the action of heat in a retort, when the formic acid is distilled over

and should be condensed in a glass receiver placed in ice water. It is, however, prepared in several other ways.

Professor Ure uses ten parts of *tartaric acid*, fifteen parts concentrated *sulphuric acid*, fourteen parts *black oxide of manganese*, and from twenty to thirty parts of water, placed in a large strong retort, and distilled over into a glass receiver kept cool.

Mr. C. Watt, Jr., employs one part *coal naphtha*, three parts each of *bichromate of potassa* and *sulphuric acid*. Place the naphtha in a flask fitted with a funnel tube; the bichromate of potassa is then to be added, and the sulphuric acid, diluted with an equal weight of water, gradually poured down the funnel; while the acid is being added, heat is to be applied, when the formic acid will distill over, and may be condensed in a glass as before directed. A portion of naphtha will distill over with the formic acid, which may again be treated with bichromate of potassa, and sulphuric acid, when a fresh portion of formic acid will be produced. If this acid be required perfectly pure, it must be saturated with pure carbonate of soda or potassa, and subjected to gentle heat to volatilize any small portion of naphtha with which it may be contaminated. The formic acid is then to be liberated from the salt by means of dilute sulphuric acid, and subjected to distillation, when the acid will be obtained perfectly pure. This process yields a large product.

Leibig prepares it on a small scale by using 10 parts of *starch*; 37 parts per-oxide of manganese, and 30 parts each of oil of vitriol and water, mixed together in a retort and subjected to a heat of 104° F.;

* Continued from Vol. 4, No. 1, page 32.

and distill off $4\frac{1}{2}$ parts of liquid. The retort should have a capacity ten times the bulk of the ingredients.

Leibig also forms pure hydrated formic acid as follows. Introduce formiate of lead in fine powder, into a long glass tube; connect one end with an apparatus evolving sulphuretted hydrogen, and the other with a receiver. When the salt is entirely decomposed (blackened) apply a very gentle heat, and collect the distilled liquid; and lastly boil the product for a minute or less, to expel any adhering sulphuretted gas. This hydrate contains one atom or 20 of water.

This acid was formerly supposed to be a compound of the acetic and malic acids, but minute investigation has presented it in a different and distinct light. When ants are irritated they eject this acid.

Formic acid reduces the salts of mercury and silver, and forms salts with the bases termed formiates. Most of these may be formed by either saturating the acid with the hydrate, carbonate, or oxide of the base; or by double decomposition, by adding a solution of a soluble salt of the base to another of an alkaline formiate. They are all soluble in water. Strong formic acid is extremely corrosive, and rapidly destroys the texture of living organic substances.

HIPPURIC ACID.—A new acid, discovered by Leibig, in the urine of the horse, cow, and other graminivora. To prepare it, concentrate the urine by a gentle heat, acidulate with muriatic acid, and set it aside to crystallize. It may be decolorized by resolution in boiling water, and treating it with animal charcoal, or chloride of lime, along with a little muriatic acid, and recrystallizing. This acid is soluble in 400 parts of cold water, but is easily dissolved by boiling water. When strongly heated, benzoic acid and benzoate of ammonia distill over in a liquid state, accompanied by a strong odor of Tonka beans, and afterwards by hydro-cyanic acid. The urine of horses or cows, left to itself for some time, or evaporated at a boiling temperature, yields not a trace of hippuric acid, but only benzoic acid. Nitric acid converts hippuric into benzoic acid.

HIRCIC ACID.—This is a name given by Chevreul to an oily liquid obtained by saponifying the fat of goats. It is prepared in the same way from goat fat as butyric

acid is from butter. It is soluble in alcohol, and possesses a mixed smell of vinegar and goats. With the bases it forms salts called *hircates*.

LACTIC ACID.—A sour sirupy liquid, discovered by Scheele in whey. Also found in some other animal fluids, and in several vegetable juices, especially in that of beet-root. There are several methods for its preparation, from which we select the following.

Evaporate sour whey to one-eighth, saturate with slacked lime, filter, add three or four times the quantity of water, cautiously precipitate the lime with oxalic acid, filter, and evaporate to dryness in a water bath; digest the residuum in strong alcohol, filter, and again evaporate. It may be then further purified by saturation with baryta, evaporation, crystallization, re-solution in water, and the careful addition of dilute sulphuric acid as before; lastly, evaporate. The evaporation should be conducted at a very gentle heat, and finished over sulphuric acid, or in vacuo. When required very pure, the product of this evaporation may be dissolved in ether, filtered, and the ether removed by a very gentle heat.

The sirupy fluid thus obtained is **HYDRATED LACTIC ACID**; it is a little heavier than water, tastes strongly acid, attracts moisture from the air, and is decomposed at a heat of 480° , with the production of **CONCRETE OR SUBLIMED LACTIC ACID**, which consists of small shining white crystals, possessing different properties to *lactic acid*. This new acid may be purified by pressure between bibulous paper, and solution in boiling alcohol, from which it separates in dazzling white crystals on cooling. By solution in hot water and evaporation to a syrup, it becomes converted into *pure hydrated lactic acid*. With the bases lactic acid forms *Lactates*, most of which may be directly formed by the solution of the hydrates, hydrated oxides, or carbonates of the bases in the dilute acid.

MARGARIC ACID. Consists of 79 parts of oxygen and 12 of hydrogen. It is prepared by acting upon dried soap made with potash by successive portions of cold alcohol, specific gravity 0.821, in which another preparation to be presently noticed is insoluble. Margaric acid combined with potassa, as the margarate of potash, is not

acted upon by cold alcohol; it is insoluble in water, and may consequently be precipitated from the aqueous solution of its salts by an acid. It is soluble in alcohol, from which it is deposited by cooling in a white crystalline mass. It fuses at 140° , forming beautiful crystals on cooling. It has an acid reaction, and forms alkaline salts very soluble in water.

OLEIC ACID—Composed of 80.97 parts carbon, 11.96 of hydrogen, and 7.7 parts oxygen. It is an oily looking fluid, congealing or becoming solid at very low temperatures, requiring nearly that of zero before it assumes the solid character. It reddens bitumens, and has a rancid odor; it is soluble in alcohol and insoluble in water. It exists in combination with potassa in union with the margarate of potassa to form soap, and differs from the margarate by its solubility in cold alcohol, by which means it is separated. Prepare by saponifying the pure oil of almonds, and then decompose the soap with a dilute acid, and digest the resulting oily acid in a water bath with half its weight of oxide of lead some hours, constantly stirring; then agitate the mixture with twice its volume of ether in a close vessel, and in twenty-four hours decant the ethereal solution; decompose with dilute muriatic acid, collect the acid that separates and remove the ether by evaporation. To render it still purer it must be again saponified with caustic soda, and the soap repeatedly dissolved in a solution of soda, and as often separated by adding common salt, until it becomes nearly colorless, when it must be decomposed by dilute muriatic acid as before.

PHOCENIC ACID.—An oily acid prepared from whale oil, in the same way as the volatile acids from butter. It dissolves in eighteen parts of water. Its salts are called *phocnates*.

PHOSPHORIC ACID.—This acid properly exists in solution, for by the application of heat, it is converted into *metaphosphoric acid*, but by solution in water, and a few minutes ebullition it is reconverted into phosphoric acid. In the dry or glacial state it is a colorless, glossy-looking substance, soluble in water, yielding a solution exhibiting strong acid properties. It is remarkable for its proneness to form subsalts with the alkalies and earths, in which one atom of acid is united with three atoms

of base. Its salts are called phosphates. When neutralized with an alkali it is characterized by giving with the soluble salts of lead, lime and baryta, white precipitates soluble in nitric acid, and with solution of nitrate of silver, a yellow precipitate. It is distinguished from arsenious acid by not being affected by sulphuretted hydrogen. It is made by calcining to whiteness 3 lbs. bones, and adding 2 lbs. of oil of vitriol diluted with three times its weight of water; mixing them well together, and digesting them with heat from two to three days, adding water occasionally to supply the loss by evaporation; then add a large quantity of water, mix well and strain; wash the residual matter with hot water, mix the liquors, add ammonia in slight excess, filter, evaporate, and ignite the dry mass in a platinum crucible.

PHOSPHORUS ACID.—Sublime phosphorus through powdered bichloride of mercury, contained in a glass tube. Chloride of phosphorus comes over, which, on being mixed with water and evaporated to a syrup, forms a crystalline mass of hydrated phosphorus acid on cooling. It is a powerful deoxydizing agent.

PURPURIC ACID.—A peculiar principle, so named in consequence of its salts always having a beautiful purple color, although it is in itself colorless, and may be produced by digesting pure uric acid in dilute nitric acid, neutralizing the solution by ammonia, and concentrating by evaporation. The purple colored crystals of purpurate of ammonia are decomposed by pure potassa, and the liquid gradually poured into dilute sulphuric acid. The insoluble precipitate that falls down is pure purpuric acid in fine powder. Purpuric acid is tasteless and inodorous; is generally in the appearance of fine powder of a milky whiteness, but is capable of crystallization; it does not deliquesce by exposure to the atmosphere, but gradually becomes of a purpleish color; it is not decomposed, neither does it melt by heat.

Purpuric acid in combination with ammonia forms a salt which crystallizes in quadrangular prisms of a deep garnet color; but when viewed by reflected light the color has a bright green appearance. It dissolves in 1500 parts of cold, and is more soluble in hot water. It is not soluble in alcohol or ether.

When the solution of purpurate of ammonia is added to solutions of various metallic salts, the following colors are produced. With the solution of—

Salt of gold, a *yellowish* solution; no precipitate.

Salt of platina, a *yellowish scarlet*; no precipitate.

Salt of silver, a *deep purple* precipitate.

Salt of zine, a beautiful *yellow* precipitate.

Salt of copper, a *bright yellow* solution.

Salt of nikel, a *green* solution.

Salt of cobalt, a *pale scarlet* solution, and small red crystals.

STEARIC ACID.—This acid exists in soap made with suet and hogs lard, and potassa in conjunction with margaric and oleic acids. To produce it, mix soap with five or six times its weight of warm water, and then add it to forty or fifty times its weight of cold water, and put the mixture aside in a cool place, the temperature being between 56° and 60° F. By standing, a compound precipitate gradually collects, composed of bimargarate and bistearate of potash, which being collected and well washed upon a filter, is to be boiled in a considerable quantity of alcohol frequently renewed, by which means the bimargarate is separated, and the bistearate upon cooling is deposited. A test of its purity consists in separating it from the potash by an acid, and then exposing it to heat; if it requires a temperature of 158° it is considered a good preparation. Stearic acid is very similar to margaric acid, but is more infusible and contains more oxygen.

URIC ACID.—Uric or lithic acid is a

very common animal acid, found in urine, in combination with ammonia or some other alkali. It is found in the urine of birds of prey, and of reptiles. The urine of the boa constrictor consists entirely of the urate of ammonia. To procure it from this last mentioned state of combination, decompose by potassa, which combines with the acid and liberates ammonia. The urate of potassa thus formed may be decomposed by any strong acid, such as the muriatic, acetic, or sulphuric acids added in slight excess. The uric acid is thrown down in the form of a gelatinous hydrate, and must be separated by the filter. By exposing it for a short time to the action of a warm atmosphere, small crystals of the acid are formed.

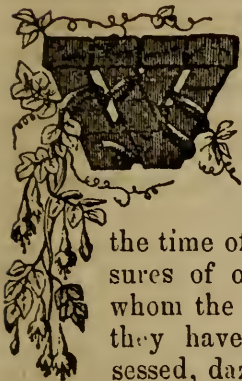
When pure the acid is white and tasteless. It is soluble in alcohol, and slightly so in hot water; it requires 10,000 times its weight of water at 60° for solution; it unites with alkalies and forms salts, known either as urates or lithates. When acted upon by chlorine, oxalic and malic acids, and muriate of ammonia are formed. Nitric acid converts it into a beautiful purple color, which is considered a certain test of its presence. When heated in a retort the carbonate and hydrocyanate of ammonia are formed, and a peculiar volatile acid, which has been named the *pyro uric acid* and which can be resublimed by heat without undergoing any change. It is soluble in boiling alcohol, and in forty times its weight of water, and is known from uric acid by not suffering decomposition by the action of nitric acid.

TO BE CONTINUED.

From La Lumiere.

PHOTOGRAPHIC RE-UNION.

TRANSLATED FROM THE FRENCH OF N. P. LEREBOURS, BY MRS. A. L. SNELLING.



WE have promised to give an account of the proofs which have been admired at the 13th meeting. We hardly know where to commence.—

We behold ourselves at the time of drawing upon the treasures of our memory, like heirs, whom the sight of riches of which they have suddenly become possessed, dazzles and paralyses.

We see no other means of overcoming our embarrassment than to speak of all these charming things in the order in which they were presented.

First, the beautiful portraits of M. Victor Plumier. Their eyes are fixed upon you as if they were actually thinking—their mouths appear as if about to speak to you, and you are almost deluded into the idea that they will soon breathe, the illusion is so complete. M. Plumier is a laborious artist, who every day perfected operations and their results. All his portraits are obtained by means of English collodion. He has been known to make use of an immense quantity of this new substance, which allows him to operate upon glass in eight seconds, with a perfection, of which I could never conceive the least idea, except from examining his works. Let us hope that M. Plumier will take some pupils. We should advise him to do so. Photography will thereby gain many skillful practitioners.

While speaking of the works of M. Ziegler, sometime ago, we have shown that we were afraid of committing an indiscretion. Now we can be able to speak very highly of them. Those that he brought forward the other evening have been justly appreciated. They bear the seal of an eminent painter. Very exquisitely shaded, lights well chosen, composition happy, all combine to render them works of great merit. A petite virgin in a niche of prayer, like those that we meet in Italy at the corners of the streets, and where the traveller

pauses to pray, a vase that a young girl has placed there while leaning upon the base of the pillar. She falls asleep and dreams. On the right and left of the altar, two trees, with their budding foliage serve as a sort of canopy to the holy image, and as a shade to the traveller. Such is the picturesque subject which M. Ziegler has given with perfect truth and a charming grace. This will be a delicious tableau, if it is not an admirable proof.

Now let us speak of illusions: M. Renard has shown us one of the most perfect that photographs can give. This is the production of an old and fine engraving from a portrait of Phillippe of Champagne. We follow with the eye the most delicate traits of engraving, and even the tone of the rich yellow with time, is found in the proof of yesterday. It is one of the most happy applications of the photograph, and M. Renard has made it with a success that has not surprised us, since we have for a long time been acquainted with his beautiful stereotypes upon glass.

In considering the claims of M. M. Baldus, Lesecq, Le Gray and Negre, the embarrassment we experienced in commencing this article seizes upon us anew. We wish to give an idea of the marvelous things which they have taken before our eyes. These will be found in all the proofs composing their collection. If we possessed the colored and poetic pen of our noble coadjutor, Henry de Laetelle, we might attempt it; but we know too well that our description will be pale and incomplete, and we are humbly silent. How, for example, can we render in words the feelings that we have experienced in seeing Avignon, the ancient christian city, with the chateau of Popes, grand as a city of war, its bridge in ruins, its two pinacles, its centre battlements, its steeples, its faubourgs, encompassed in a proof of fifty inches by M. Baldus? He tells us, as he shuts his port folio, that all he has shown us is nothing to what he will exhibit after his second voyage. We believe it, not—

withstanding our astonishment. He has enough talent and faith in his art, to obtain still finer pictures.

One of the most precious proofs of M. Neipce de St. Victor, remains still to be noticed. We have it before our eyes. It represents a Spanish smuggler, catalanonian hat upon his head, a trombone in his hand, and is from a colored engraving. The costume is composed of a sort of tunic, blue and black, red vest, culottes and green girdle. We have not seen the engraving, we can only describe the proof. We here see neatly and freshly applied

the colors of which we speak, and that M. Neipce has brought out the luminous rays by fixing them upon the silver plate. The heliochromie exists. M. Neipce has created it.

In closing this rapid and imperfect sketch, we remark that after the Monday's soiree, we should experience a painful feeling in thinking that these works of art in photography, will be unnoticed in the exhibition or trodden down at once, and the public not have the opportunity of showing their admiration of them, and encouraging their increase.

THE AMERICAN ART-UNION.

BY J. K. FISHER.



see by the papers that the Court of Appeals has adjourned, *sine die*, without giving a decision on the Art Union case. I am told that the next term will be in September; so, I presume,

we must wait three months longer to know whether the decision of the supreme court is to be confirmed or reversed. This delay completely prostrates the business of the

Art-Union, while its expenses are still very great, in rents, salaries, law costs, etc. Knowing this, and having, as I learn, an earnest request from the appellants' council, that the decision might be given soon, the court could not have failed to appreciate the injustice and *oppression* involved in delaying a decision that would liberate the Art-Union from its restraint, if such decision were admissible by the laws. I infer, then, that the court of appeals does not find it possible to reverse the decision of the supreme court, given on the suit of the people, for the delivery of the property forfeited by the violation of the statutes against lotteries, and the suit of the governors of the alms house for the delivery of the said property to them. We have had

then, in support of the view that the Art-Union is a lottery and illegal, first, a decision of the Recorder; second, a decision of the superior court, granting a temporary injunction; third, a decision of the supreme court, two judges concurring and one dissenting. To reverse this decision will require a concurrence of five out of the seven judges of the court of appeals. How far likely to take place this may be judged by a comparison of the judicial and extrajudicial opinions thus far given in the case. In favor of the decision, judges Oakley, Mitchell, Roosevelt, and the Recorder; against it, judge Edwards. Extra judicially, judge Daly and ex judge Jones have given opinions in favor of the Art-Union. Judge Duer, of the superior court, declined giving a decision upon the question of legality, which he deemed unnecessary, and beyond his province at that time, as the case in the supreme court was then pending; but he dissolved the temporary injunction, on the ground that if the Art-Union was illegal the property had become vested in the state, and the plaintiff was a participator in the crime, and therefore not entitled to redress. I feel a deep interest in the general question at issue, whether works of art may lawfully be sold by means

of a lottery. The Art-Union claims, in its defense, that they may be so disposed of; and that no special permission is required. In its Bulletin's it has claimed the contrary: it has said that "one concern," by which I suppose it meant the International Art-Union, which adopted a plan almost or quite the same, was an illegal lottery. It further claims that if, by an illiberal construction—the same construction it has itself given against its rival—it should be decided that *without* a special permission no party can sell pictures in this way, then it is provided with such a permission in virtue of the words of its charter which follow, in italics:—"the annual meeting shall be held on the Friday evening next preceding Christmas, when the distribution *provided for in the constitution* shall take place." Here is a distinct claim, now made in court, which has all along been made in the Bulletin, that the Art-Union has a legal monopoly of the lottery method of selling on pretence of distributing works of art: hence no artist can lawfully sell his own works in this way.

If it be free to all to sell their works in this way, it will be most satisfactory to artists; but if this prerogative be vested solely in this clique of domineering tyrants, it will be a hardship which will bear most oppressively on them; until their exasperation, caused by long suffering shall prompt them to meet oppression by defiance and vigorous assault. A power like this, placed by the state in the hands of vulgar and vain men, who by their charter are prohibited from being artists, and afterwards denied to a body of artists who petitioned for it, is, for a free country, rather anomalous, and infernally abominable, if one could think seriously of such a stupidly ridiculous pretence.

All appearances indicate that the lottery feature is illegal, and will be so decided. In this case the works offered for distribution are forfeited to the use of the alms house. And this must be their destiny, unless the legislature by a special act shall exempt them. This may, perhaps, be done, in consideration that the subscribers have been deceived by the pretences of the managers that they had a special authorization to operate in the manner they used.

But who can send a petition for this ex-

emption? Can the managers, after their course of disingenuous applications for changes of the mere time of holding their meetings, concealing under them, obscured by ambiguous words, what they afterwards used as the foundation of a claim to the exclusive right to distribute works of art in this way? Impossible! A petition from men thus implicated should instantly be met by a criminal prosecution, which would subject them to a penalty of \$1500 each, or imprisonment in the penitentiary.

If any steps are to be taken for the release of the works, the first step must be the removal of the managers. In justice to them I must say that I presume they will tender their resignations. The next step will be to appoint a new board of managers. These may petition for a release. But such a petition should be rejected if the plan of division of the existing property, said to be near \$100,000, among the present members, be not distinctly repudiated. A part of this property has been contributed by the subscribers of former years, nearly all of whom are probably not subscribers for the last year. There should be, resulting from the 5 per cent deducted from the payments of these former subscribers, for the building fund, \$27,500, with the accumulated interest of several years, thirty thousand dollars more. All this was contributed for the purpose of establishing a permanent free gallery for the public, with no understanding that it should be divided until it should be so reduced that no gallery could be maintained. Yet under a provision for the distribution of the remnant which might remain from a decayed and extinguished gallery, I have heard from various quarters, it is proposed, or talked of, in the concern, to divide the property; giving twelve shares each to those of the present members who have been twelve years members, and one share each to those who have been members but one year. This would afford a snug sum each to the faithful few who have been interested in the concern from the beginning: but the legislature, as the guardian of the rights of former subscribers, and the public, will or should see that a fund sufficient to found a gallery, and contributed for that special purpose, is not embezzled in this manner.

As to that part of the property which

clearly belongs to the subscribers of the last year, it cannot be equitably divided, except by a sale, for which the market is now so ill proposed, that much less even than the value of the works would be obtained: a mere trifle would be realized; hardly enough to pay expenses and postages. It would be atrocious waste to force a sale.

The only reasonable way is, to hold them as stock, at a fair valuation; and to credit each member with his share; allowing him, as soon as it has accumulated, by interest and succeeding contributions, to an amount sufficient to purchase a work of art, to select and withdraw one. As to the gallery fund, that is sacred, not to be dissipated while a gallery can stand. "In case of the closing up of the institute" who has a right to close it, and pocket this money, while it is possible to keep up a gallery? If such a villainous scheme is consummated under the noses of the legislators, it will be an outrage upon civilization.

The present gallery, then, with its old stock—nearly worthless—of copper plates, etc., is the property of the public, to be under the control of such respectable persons as may choose to become members, and pay five dollars per year towards "the promotion of the fine arts in the United States." Selling out! Dividing!!

Now as to that insulting clause in the charter, which provides that no artist shall be a manager: it ought to be repealed. It is enough that the members may choose non-professional managers if they please. I would merely suggest that two boards, one professional, the other non-professional would probably be the best.

Under such a charter, the Art-Union,—with, I hope, a better name,—would absorb into itself the whole artistic body, who as a democratic element, would elect one board of managers; and the National

Academy, now rapidly declining, would verge its property into it. Likewise the New York Gallery would join the union. All together might form an organism of some force, that would excite some interest; and the arts, being liberated from the dominion of crockery-dealers, and the ridiculous mock-dominion of an ape of the Royal Academy, would grow naturally, and find means to excite and satisfy and refine the taste of the most capricious and impulsive public in the civilized world; a public that will freely give millions when their better feelings are appealed to, but will refuse one dollar for life membership, if there is anything paltry and ridiculous in a scheme.

The principal parts of the plan I proposed in your June number would easily be annexed to this general organization. The loan fund, for such as liked it, would find in it a local habitation; the letting of strips of wall might or might not be adopted,—I think it should be.

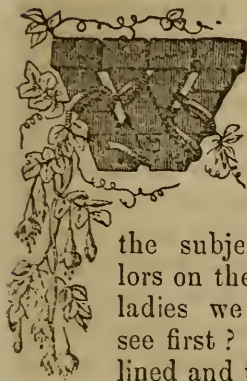
I now put this question: have I predicted the course of the Art-Union? If that course is to depend upon the mere will of the clique who have controlled it of late years, I apprehend not: but if justice, and a wise and liberal policy are to rule, then I think I have pointed out the course that the mass will take. What I mean is, not that my plan will transform things or direct events, but things will take this course, because it is the best now available. The wind is not very fair; and no better course will now give us headway.

But this probability renders it the more necessary that the democratic party should organize itself, as the oligarchic party has done long ago. A mere multitude is powerless; it needs that there should be organisation and discipline. And I hope that the movement that has of late been discussed, will as soon as possible be effected.

From the London Art-Journal.

ON THE HARMONY OF COLORS, IN ITS APPLICATION TO LADIES' DRESS.*

BY MRS. MERRIFIELD.



He broke off rather abruptly in our last notice, when we were speaking of the inharmonious colors frequently seen in the dresses of females. Resuming the subject, let us note the colors on the dresses of the first six ladies we meet. What do we see first? a fancy straw bonnet, lined and trimmed with rose color, an orange shawl, and a lilac muslin dress. The next wears a blue bonnet, lilac visette, and a pink dress. A third has a violet bonnet, pink bows inside, sky-blue strings, and a green veil. Now we follow a lady in a cool green muslin dress, a white shawl chequered with peach-blossom and green, the bonnet peach-blossom, trimmed simply with ruches of narrow tulle. Here, our companion exclaimed, is an exception to your rule, it is impossible that two colors could be better contrasted or harmonized. Stay, we replied, let us see the lady's face, and ascertain whether the same harmony is preserved throughout the costume. We accordingly quickened our pace, passed the lady, looked in her face, and saw—bright amber-colored bows inside her lilac bonnet, and large strings of yellow ribbons with a red stripe! The very thought of such a combination of color sets one's teeth on edge.† Who comes next? a quaker lady, with her close and prim drab silk

bonnet lined with white, which is thrown into shadow by the close form of the bonnet, and is separated from her fine complexion by her smooth bands of hair, and the neat ruche of gauze; she wears a drab silk dress, and a plain white shawl, over which is turned a collar of the whitest and most transparent lawn. It is positively a relief to the eye to rest on the quiet dress of this lady, after the shock it has received from the inharmonious contrasts we have just described. Formal and stiff as the bonnet worn by the ladies belonging to the sect of Friends, is in shape, we cannot for a moment hesitate which is the most lady-like and the most becoming dress; indeed, it is somewhat difficult to imagine that quaker ladies, who have the use of their eyes, have never, between the days of George Fox and our own times, made the important discovery that the semi-neutral colors which they so generally adopt are becoming to the complexion. If this were not the fact why should Titian, Vandyck, and other great painters introduce a drab-colored scarf or veil around the bust of single figures, and in contact with the skin? and why should this contrivance be adopted by modern painters also? It is known that the effect of the drab scarf is to make the flesh tints look brighter by contrast.

In the same manner the large ruffs—we do not, of course, allude to those which were stiffened with yellow starch—that were worn formerly, produced by the shadow of their numerous folds, the effect of grey, which received by contrast a tinge of the complementary color of the carnations, and so produced harmony. The ruff had also the advantage of separating, by its broad shadow, the carnation tints from the decided colors of the dress.

When speaking of the use of grey as a

low was too powerful for the light tint of purple to which it was opposed. Had the latter been dark—of the hue of the heartsease, for instance, the impression on the eye would have been less unpleasant, and the want of harmony in the colors less perceptible.

* Continued from page 53, Vol. 4, No. 1.

† The reason why the contrast of red lilac or peach-blossom with yellow is not harmonious, is because both colors are warm, and warm colors are always opposed to cold ones, consequently, the nearer the yellow approaches to orange, the colder should be the violet or purple to which it is contrasted, and as the arrangement in the present instance was light red or warm purple, with yellow, which from the red stripe on the ribbon appeared orange, it will be seen that the rule to which we have referred was violated. In addition to the inharmonious contrast of color, there was also a discordancy in the *tone* of the colors. The yel-

harmonizing color, the subject of grey hair naturally suggests itself. We are pleased to see that the disingenuous and idle custom of concealing the encroachments of time, by the substitution of false hair, is fast passing away. To those who wear hair to which they have no claim but that of purchase, and who still feel disposed to hide their grey hair with borrowed locks of more youthful appearance, we would suggest that when, as Camoens says,

"Time's transmuting hand shall turn
Thy locks of gold to silvery wires,
Those starry lamps shall cease to burn
As now with more than mortal fires;
Thy ripened cheek no longer wear
The ruddy bloom of rising dawn,
And ev'ry tiny dimple there
In wrinkled lines be roughly drawn."

the face as well as the hair, will bear unmistakeable traces of the lapse of years. The chestnut or raven hair of youth, never harmonizes with the face and lineaments of fifty; but, by wearing the natural grey hair, the whole countenance acquires a general harmony which when accompanied by an expression of intelligence and goodness, compensates in some degree for the loss of the bloom of youth.

Although we cannot see any beauty in hair when its color is in that state of transition, which Butler attributes to the tawny beard of Hudibras—

"The upper part whereof was whey,
The nether orange, mixed with grey:"

we do think hair which is white, or nearly so, greatly improves the complexion when the latter is not of too deep a color. That this effect is totally independent of any associations connected with age, is, we think, fully proved by the former prevalence of the almost universal fashion of using hair powder. We have already alluded to the good effect of white and grey—produced by a ruche of tulle—round the face, and we cannot but think that the custom of wearing hair-powder, although it may have originated in the desire of some votary of fashion to conceal the inroads of age, was rendered popular by the discovery that it improved the complexion. White veils, lace, and gauze, approximate, by means of their folds to grey; and are useful in softening and harmonizing.

But we are wandering from our subject,

namely, the consideration of the adoption of different colors at the same time, as articles of dress. We should strongly recommend that, if different colors are worn at the same time, that they should be such as contrast, or harmonize, exactly with each other, and in such proportions as to produce the most agreeable effect on the eye. In general the broken and semi-neutral colors are productive of an excellent effect in dress; these may be enlivened by a little positive color, the accessories should be quiet and unassuming, and the contrasting color, which should always be chosen in accordance with the foregoing principles, should in general bear but a small proportion to the mass of principal color. A blue bonnet and dress, for instance, may, when contrast is desired, be worn with an orange colored shawl; but, as orange is a very powerful color, the blue, in order to balance it, must be of a very deep tone. In the same manner, a pink bonnet may be worn with a green dress—and a green bonnet with a pink dress, but the hue of it should be carefully assorted, according to *exact* contrast.

In some cases not only two, but three colors may be worn simultaneously, without incurring the imputation of gaudiness. This will, however, depend upon the skill with which the proportions, and the different hues of color are adjusted. An instance of the unison of the three colors occurs in a favorite trimming for the exterior of summer bonnets, namely, a wreath of red poppies and blue corn-flowers, mixed with yellow ears of ripe corn; the colors of which are *sometimes* very agreeably contrasted. Colored shawls, again, are instances in which a great variety of colors may be arranged with harmonious and rich effect; but to set these off to the greatest advantage, they should be worn over plain-colored dresses. The variety of colors in shawls is frequently so great, and they are so broken and intermixed, that, at a small distance, they cease to be distinct, and must be considered rather as hues than as colors. It is always a rule that, if one part of the dress is highly ornamented, or consists of various colors, a portion should be plain, in order to give repose to the eye. For the same reason, figured dresses should be accompanied by plain colored shawls or cloaks. It

is to this principle of contrast, without gaudiness, that the popularity of black scarves, and cloaks, is to be attributed.

If it is necessary that the colors of the different articles of dress, should contrast agreeably or harmonize with each other, it is equally important that the same harmony should be preserved in the colors employed on a single piece of silk or stuff. In these and other textile fabrics we find too frequently that the fancy of the manufacturer has been the only rule for the arrangement of the colors, and the laws of the harmony and contrast of colors are set at defiance. The French manufacturers pay greater attention to the subject, and the good effects of this study are visible in the productions of the French looms. We trust that the influence of the schools of design, and the dissemination among all ranks of a knowledge of the laws regulating the contrasts of colors, will develop a more correct taste in this country, both among the producers and the consumers.

A certain amount of information, which appears rather to have been derived from tradition, than science, certainly prevails, with regard to this subject; and the bad use that has been made of it, proves the truth of the old adage "a little learning is a dangerous thing." We cannot illustrate this better than by referring to the class of textile fabrics in which the warp and woof are of different colors, and which are familiarly called "glace" or "shot" silks or stuffs. It is commonly understood that red contrasts well with green, blue with orange, lilac with green, and purple with yellow, and an impression appears generally to prevail that if any two of these contrasting colors are united in one piece of goods; if, for instance, the warp is green and the woof red; that the finished piece will present a rich and harmonious contrast of colors. If, however, all our manufacturers had been possessed of a more extensive knowledge of the principles of the harmony of colors they would have been aware of the fact that red and green when mixed neutralize each other, producing, according to the proportions in which they unite, a semi-neutral tint, which carried to the extreme, produces blackness. A very slight degree of observation on the dresses of this nature which one meets with in the street, will be sufficient to convince us that this effect is

produced by the union of the colors above-mentioned, but the cause does not appear to have been understood. The effect of such mixtures is heavy and sombre. Changeable and "shot" draperies are not a modern invention; they have always been favorites with the Italian painters, who have introduced them into their pictures with the happiest effects, and they were in use as early as the time of Cennini. Whence comes it then that draperies of this description are pleasing in pictures, while many of those which we see daily are displeasing to the cultivated eye? It is because the old Italian masters combined their colors according to the principles of harmony, and if we would produce the rich effects that they did, we must first investigate the principles by which they were guided, and then act upon them. If writers on art afforded us no information on this subject, there are in this country paintings enough by Raphael, Titian, Paolo Veronese, and other great masters (access to which is readily obtained by all who are willing to study them), which reveal these principles to an intelligent observer. The secret of their success will be found to consist, not in combining colors which *contrast* with each other, such as red and green, purple and yellow, which look well when placed side by side, but when united *neutralize* each other, but in combining colors which are *near* to each other in a prismatic scale, and which, when united, produce a clean color, a harmony of analogy, not of contrast. We shall illustrate this by examples from pictures by the old masters; beginning with those in the National Gallery in which may be seen figures habited in changeable draperies. In the Consecration of St. Nicholas by Paul Veronese, the drapery of the first figure in the left hand has red shadows and yellow lights. Now these two colors, red and yellow, although not harmonious alone, make when united, orange, which is a clean color, and in the prismatic gradation is situated between, and is composed of the red and yellow. The effect of this combination of colors is bright and agreeable, and the discord or rather the suspended harmony of the two primitives is resolved by the formation of the intermediate color, orange. The drapery of the angel in the same picture has pinkshades and light yellow lights;

here also orange may be produced by the mixture of the two colors, and the effect will be equally pleasing with the last. In the Holy Family of Andrea *del Sarto*, the upper drapery of the Virgin is blue with deep or subdued yellow lights; now yellow and blue make when united, green; we therefore trace the same system of harmonious arrangement in this changeable drapery as in others. Turning now to the portrait of *Ginlia Gonzaga* by Sebastian *del Piombo*, we find the colors still more nearly allied; the shadows of the drapery are green, the lights yellow, these if mixed would produce a yellow-green, intermediate between the color of the lights and shades. In the *Musical Party* by Titian we find a figure whose drapery is green with yellow-brown lights. The lining of the mantel of the Virgin in the picture by Vandyke has grey shades and pale yellow lights. We subjoin a few more examples from pictures on the continent for the sake of the combinations of colors, and to show how the principle of the harmony of analogy is carried out by the Italian masters. In a picture by Titian at *Brescia* there is a light blue drapery, with pale yellow lights. *Paola Veronese* introduces in one of his pictures in the Ducal Palace at Venice, a drapery with lake-colored shadows and yellow lights, and in pictures of the Venetian School, we often find the lights of draperies pink, and the shadows inclining to blue. *Bernardino Luini* was fond of introducing changeable dresses. Among other draperies in his pictures at Milan are the following: white lights with yellow shades; green shades with yellow lights; red shades with darker yellow lights; others with dark red shades and light red lights. From these examples, therefore, we may learn, that if changeable draperies are to produce brilliant and clean effects of colors, the lights and shades must be chosen from colors which approach each other in the prismatic scale, and that the contrasts of colors, with their complementaries, are to be avoided, unless it is wished to neutralise them and produce a sombre effect. Variations in the tone of the color, simply without changing the hue, are frequently sources of very agreeable combinations of color. Some of the most beautiful French figured silks are produced with two or three shades of the same color, with or without the addition of

white. It is to be observed, that in these remarks, we allude only to the production of a pleasing and rich arrangement of color on the silk or stuff itself, without any reference to the effect on the complexion.

A few general observations connected with the subject of color, as applied to dress, occur to us. We shall mention the following:—

Black and dark dresses have the effect of making the persons wearing them appear smaller than they really are; for this reason they are suitable to stout persons. The same may be observed with respect to black shoes, which diminish the apparent size of the foot.

The contrary effect takes place with regard to white and light-colored dresses, which make people look larger than they really are. Very stout persons should, therefore, dress in black and dark colors.

Large patterns make the figure look shorter, without diminishing its apparent size. The immense patterns which are now so much the fashion, are only fit for window or bed curtains, or, at least, for a lady of gigantic proportions who wears a hoop.

Longitudinal stripes, in dress, if not too wide, are considered to add to the height of a figure, they may, therefore, be worn with good effect by persons of low stature. Horizontal stripes have a contrary effect, and are far from graceful.

Before dismissing the subject, it will be proper to advert to the effect of artificial light on the complexion and dress. The general effect produced by this light is to warm the complexion, which it does by increasing the orange tint, to strengthen and darken the shadows by the contrast of light and shade, and to increase the brilliancy of the eyes, by the masses of shadow which it casts around them. The effect of artificial light on colored draperies is somewhat different. The light diffused being yellow, this color is rendered pale, and is frequently lost entirely. There are, probably, few persons who have not observed that primrose-colored gloves appear white by candle-light. Orange and red become warmer by this light. Sky blue, seen by artificial light, acquires a green tint; indeed, it can scarcely be distinguished from green. Dark blue, assumes a dark and heavy color, green nearly resembles blue, and purple becomes redder if it inclines to red, and darker if i

inclines to blue. When, therefore, a dress is to be worn by artificial light, the color should be selected with a view to the modifications it will receive from this light.

The dress of gentlemen will not detain us long. Up to nearly the close of the last century, their dress was characterised by as many colors and extravagancies as that of ladies; but, for the last fifty or sixty years, colors, as an appendage to male costume, and except as regards military or naval uniforms, are now, by common consent, almost entirely banished to the servant's hall. Here, however, the laws of the harmony of colors are as applicable as to ladies' dress. The colors of a livery suit should be as harmoniously contrasted as those of a court dress; and yet we frequently observe in the former inharmonious contrasts of color. It is hoped however, that enough has been said on the general contrast and harmony of colors, to render any further remarks on this subject unnecessary.

We have thus endeavored to place before our readers an abstract of the laws which regulate the harmony of colors, and we have shown the application of these laws to the subject of ladies' dress. It may be considered by some persons that we have given the subject undue importance, and that the effect of our remarks will be to encourage vanity and frivolity, to awaken a taste for display, and to induce our fair readers to devote to the study of dress that valuable time, which might otherwise be occupied in the improvement of the mind. Some also may object that the person who makes such a science of dress, will never apply to more severe studies. We shall endeavor to remove these objections. In the first place it has been said, "Whatever is worth doing is worth doing well." Dress, therefore, being indispensable, it is incumbent on all persons to dress as well as they can, and to render their costume as becoming to themselves as possible, consistently, with a due regard to climate, convenience, and station in society. In the second place quite as much time is consumed in dressing ill, as in dressing well. In fact, where there are no correct notions on the subject of dress, much time is unavoidably spent in the choice of the materials, when fancy or inclination is the only guide in their selection; article after article is turned over, and

colors are admired or not, according to their beauty in the eyes of the purchaser, without reference to their harmonizing with the complexion, or with other articles of dress. The circumstances that Lady—— had a dress of this satin, or the Honorable Miss—— one of that velvet, or the still greater recommendation that a dress or shawl was quite novel, that it was just received, will frequently be sufficient inducement to determine on the selection of an article, the color of which may be extremely unbecoming to the complexion. The article being purchased and worn, the purchaser is disappointed in its effect; and if economy is no object, the dress is thrown aside, and another selected with as little judgment as the first. If, on the other hand, a lady who is acquainted with the principles of the harmony of colors, has considered first whether she belongs to the class of blondes or of brunettes, and secondly, whether she is florid or pale, the difficulty of selection is in a great measure removed, and not only her own time, but that of the shopman is saved by her naming the class of colors from which she means to select a dress, and which she knows is most suitable to her complexion. Having made this choice, the selection of other articles which harmonise with the color she has decided upon, is comparatively easy. When dress is selected with due regard to these conditions, namely, harmony with the complexion, and harmony of contrast, it is worn with greater pleasure, the eye is satisfied with the arrangement, and the lady appears well dressed, because her dress is becoming to herself, and because one part of it harmonizes with the other. The dress of such a person will never appear remarkable; no violent or harsh contrasts of color will prevail in it, but it will exhibit such a proper mixture of positive colors with others of broken or quiet hues, or of black or white, as will produce an agreeable impression on the sight, and entitle the dress of the wearer to the distinctive appellation of *lady-like*. It is our firm belief that such a knowledge as we have been endeavoring to inculcate of the principles which govern the selection of colors for ladies' dress, will, besides the advantages to which we have now alluded, be the means of economising time, and thus of affording leisure for more valuable pur-

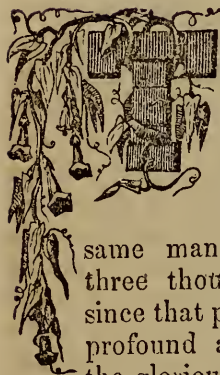
suits. With regard to the question of vanity and frivolity, we think that a person who will study the harmony of colors as applied to dress in the manner we have indicated, will, by the time the principles of harmonious coloring are thoroughly under-

stood, have imbibed such a love for the study, that the mind, instead of being debased, may be led on, step by step, to investigate the beautiful phenomena of nature, and from the study of dress, may rise to the study of natural philosophy.

COLOR AND LIGHT.*

BY M. ZIEGLER.

Translated from the French, by Mrs. A. L. Snelling.



HE opinions of men, although far removed by time have a strange correspondence. Among the modern savants, the most celebrated have described the atmosphere in the same manner as Plato, although three thousand years have elapsed since that philosopher flourished. A profound abyss separates us from the glorious age of Greece, and we cannot see without astonishment the science of the two shores from the gulf which contains the fallen empire and the sombre middle age, arriving at the same perfection, with such an analogy of views and expressions.

Plato has said: "A region perfectly pure is above us in the heavens where the stars revolve, which the most part of persons who speak of it denominate ether. The earth which we inhabit, is only like the dregs or sediment of this celestial air, and is rendered still more gross from the effluvia constantly arising from its lower depths, in which we are constantly plunged without perceiving it, and we believe ourselves to be inhabiting a pure earth, in the same manner as some one who making his habitation in the abyss of ocean will imagine himself truly to inhabit the sea, and who seeing the rays of the sun and the stars traversing the deep, will take the sea for

the heavens, and never having been above, or ever advanced his head out of the water, can never have experienced how much purer and more beautiful is this place which we inhabit than that which he inhabits, and will never have found a person who will inform him of the fact. Behold then justly the case in which we are—confined in the lower depths, we imagine ourselves in the higher. We take the air for the heaven, and we believe that it is the veritable heaven in which all the stars take their course. And the cause of our error is, that our sluggishness and our weakness, prevents us from ever elevating ourselves above this thick and troubled air, for if any one mounts to the height he might be able to do with wings, he will not so immediately have surmounted this gross air that he will see what passes in that happy region, as fish carried along and floating over our seas and rivers see what passes in the air which we breathe. He will know *the true light*. What is found in the other region, is as much above what we see in this, as what we see in this is above what is found in the sea."—(*Extract from Phædon.*)

M. Humbolt expresses himself thus in 'Tableau de la nature': "The mobile gaseous ocean in which we are incapable of elevating ourselves clearly from the surface, offers without doubt the most indispensable aliments to a multitude of organised beings; but there is necessary to these beings a nourishment still more substantial which only exists in the depths of the aerial

* Continued from Vol. 4, No. 1, page 29.

ocean. This depth is of two kinds, the firm earth, etc ; the water forming the largest part.

For the antique philosopher and the modern practitioner, the atmosphere is an ocean.

In short in advancing in this arduous career which I have undertaken to survey, and to point out the most desirable means of accomplishing, I will place before the eyes of the reader, new materials, at the same time that the deductions will present themselves, and in which the relations to the preceding chapters will be found established without effort or demonstration. As the moment arrives in which this incertitude ceases, the hypothesis commences, I shall establish the hypothesis upon a solid basis.

The meteorologist Koemtz submitting without resistance to the doctrine of the seven colors forming the white light, has nevertheless submitted a series of atmospheric observations, the quotations of which will here be of great importance.

Here are some lines translated from the German by my friend Charles Martin, at present professor in the academy at Montpellier.

"Notwithstanding its feeble absorbing power, the air is not, however, a completely transparent body. If it were so, the vault of heaven would be black, and the sun and moon appear like luminous discs clearly circumscribed. Every where to which the rays of the sun cannot penetrate or directly be reflected by terrestrial objects, there will be a complete obscurity, and at the moment in which the sun sets the day will briskly succeed. From what thus happens, ought we not necessarily to conclude that the particles of atmospheric air absorb a portion of the light which they receive, leaving one part to pass away, and reflecting the third ; and from hence it happens that they light the vault of heaven, illuminating terrestrial objects, that the sun does not light directly, and determining an insensible transition between night to day. We can be assured from daily observations of the feebleness of the solar light during its passage through the atmosphere. If we fix our attention during several days, upon the same object situated near the horizon, we shall see that it is sometimes very visible and at others less so. Some small

objects disappear when we remove from them ; that accounts in part for their apparent size diminishing with the distance. But this is not the only cause, for the distance at which they disappear is sometimes greater. We can be convinced of these by direct measures, and explain the transparency of the atmosphere by numerous facts.

"While the chain of the Alps, seen from the plain at a great distance is clearly visible in its least outlines, the spectator placed upon one of the summits hardly distinguishes anything on the plain. The country which extends beyond the lake of Brienz seems to be covered with a veil, only the summits of the Pilate, the Foret-Noire and the Vosges at a great distance are clearly designated, whilst nothing is distinct in the plain between the Alps and Jura. It was with much trouble that I could perceive, at a very serene time, the village of Berne, by straining the eye-sight and in the meantime le Faulhorn is very visible from the city. This is easily explained. In fact while the mountains make a contrast by their opacity and their deep color with the transparency of the heavens, and are very clearly drawn all the objects of the plain, are clothed in a sombre tint and a uniform green ; thus at a certain distance, an isolated object will not be perceived in the midst of those which surround it. It is not only the rays proceeding from terrestrial objects which are in a part absorbed by the atmosphere. It is the same with those that come from the sun. The curved surface which limits the atmosphere being parallel to that of the earth, and its thickness being not at all comparable to the mass of the terrestrial sphere, we may suppose without sensible error, that the plan of the portion of the atmosphere that the eye can embrace is sensibly parallel to the horizon. If the sun be at the zenith, its rays will travel the shortest way to arrive near us. The more the sun approaches the horizon, the thicker the rays become that travel through the atmosphere, consequently the more light there is the feebler the rays will be. Experience proves this every day. The rays of the sun or moon in their passage to the meridian are thick, while they appear like fixed stars as they approach the horizon. For the same reason, the regions near the horizon appear always deprived of stars.

They are in effect invisible, because their rays cannot approach us near enough to penetrate the thick bed of atmosphere through which they have to travel, but they have become perfectly visible the nearer they approach the vault of heaven."

I believe I ought to carry out the extent of this quotation. M. M. Humboldt and Kœntz corroborated the idea of Plato concerning the opacity of the atmosphere and upon the impossibility where we are of knowing the whiteness of the light of the sun, at least of elevating ourselves to the surface of the atmospheric ocean.

The word *white light* universally employed in the experiments on the light, and the explanation of the phenomena of colors, is only then a conventional term of which the translation in the language of truth will be *grey light*. Having promised to respect the conventionalism of language, and of managing the established prejudices that merit the regard of ancient possession, we shall content ourselves with insisting upon the fact without proposing a grammatical modification which strikes us at the time upon all the scientific European writings where it is a question of light and colors. We have remarked in the evolutions of science, that the question of words sustains more than all contradictory propositions the obstinacy of the self-willed. God preserve us from such tempests.

Having demonstrated in the ulterior propositions how much color is different from light, since in certain cases it produces effects diametrically opposite, the preceding quotations upon the composition of the air, prove in their turn, that the light which has traversed the midst of the atmospheric opal, cannot be white. As to the brilliant sidereal light which proceeds from the combustion of carbons and metals by the means of electric piles, it is also of atmospheric origin; for the materials eminently combustible, have appertained to the atmosphere and cannot be solidified except with the freezing of the globe, thanks to the incessant intervention of vegetable apparel. The coloration of the metallic flames has itself alone excluded all idea of whiteness.

But if the belief is well founded that the sun projects a truly white light, we can only hope of obtaining it on the surface of the gaseous and opaque ocean to the depth of

which we are confined by our organization.

MM. Bixio and Barral who elevated themselves the 59th of June 1850, to a considerable height, were struck with the extreme whiteness of the sun.

Then from his second ascension at Ham-burgh, Robertson provided himself with a certain number of astronomical instruments, among which was a prism. Arrived at the last limits of his course, this astronomer, consulting the prism, saw with astonishment *the coloring become faded and uncertain, and cease to be lively and distinct*.—(Memoirs of Robertson, Vol. II.)

The question of colors is so inherent with that of the atmosphere, that it becomes necessary in short to find out how much they contain in the state of confused accumulation, the three primitive colors combining themselves with the luminous rays in their transit, then separating themselves from each other with distinct properties of light, of color and chemical action.

We can consider as a first step toward this result, the presence, recently demonstrated, of iodine in the air, of which the chemical analysis has even to this day produced only 25 parts of oxygen to 77 of azote.

Soon probably the chlorine and bromine will be added to the iodine. Then will appear the series of etherial substances which flow into the aerial ocean which correspond by their gaseous composition with the liquid composition of the briny ocean. The iodine in the air, discovered by M. Chatin and announced in the academy of sciences by M. Dumas on the 5th of May, 1844, is a sufficient indication of the atmospheric source from which the blood, the flowers, the white rays of the sun possess the mysterious and innumerable treasures of color.

To resume: if we know that the atmospheric light is grey; if we know that the grey is formed by the union of three colors combined with a relative quantity of white light; if we know that the three rays conducted in the luminous rays are separated by means of a prism; if, in short, we admit, according to the experiments of MM. Herschel, Becquerel, Niepce de St. Victor, that the colors are not only separated from each other, but that they separate from the light and are susceptible of material fixation upon metallic

plates, the question of the phenomenon of colors will have made a notable progress; that which was complicated will become simple, and that which was disordered will be put in order. The supernatural enters into all the efforts of calculation and of nature. Then we see clearly that the white, which is *one and the same as light*, is distinct from black, which is *multiplied* like the color, in the same way that a straight line is distinct from a curved one.

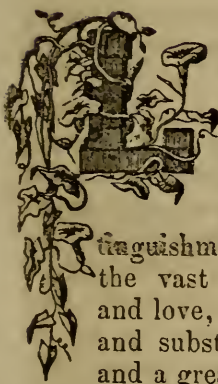
Like some combatant friends who will recognise in the first rays of a dawning day the partisans of emission, we shall then see

that they have considered the phenomena of the light, without taking account of the inevitable intervention of the phenomena of colors, and their condition upon mingling with the light. The partisans of undulation, on the contrary, having united the two phenomena, allow that they have been logically supported in their system by the wish of uniting in one sole theory the combined reactions of color and light: the one being directed by the straight line, the others influenced by a curved line.

J. ZIEGLER.

TO BE CONTINUED.

PEREGRINATIONS OF A DAGUERREAN.—No. 4.



LONG, long ago, I wrote my Peregrination No. 3, from the shades of "Wake-field," when I had conceived a violent *fancy* for a pretty girl whom I named Miss Farilla by way of distinction. I have since learned the vast difference between fancy and love, and flimsiness of character and substantiability of personality, and a great deal more besides.

You know we live and learn. And I have learned to put not my faith in Post-Masters. Editors too, although they know where you are by the superscriptions of "letters received," neglect to pay you that attention which implies a desire to "hear from you oftener." Johnson, just at my elbow, "thinks pretty much as I do," and says either the mails or the males are out of order. We manage to travel, and know not why letters and magazines, and "Art-Journals," cannot travel as well.

We are mystified and in a quandary.—We are in Charlotte, too, where things are in a whirl, and a special chaos prevails. Railroads, property, dollars, plank roads and buildings, are dancing a jig, and there is no room for education and the arts. Expectation is on tip-toe, and the struggle

for an upper round of Fortune's ladder is "pluperfectly execruciating." There is a feverish fictitiousness "rampant" in the beautiful little town of Charlotte in the Old North State, but when calmness and a natural coolness obtains once more, Charlotte will be one of the desirable locations we read of. Dr. Wilde and daughter are the resident artists, and in the daguerrean scale they rank with Mr. Smiley and other first rate artists of the semi-migratory caste. Dr. Wilde and daughter are doing a very fair business, considering "the state of the nation" in Charlotte. They merit more than they will ever do in so small a place, and seem, like Mr. Smiley rather out of place, while out of the best daguerrean galleries in the largest cities.

The pictures of these artists bear all the marks of strictly artistic tastes, and are neatly and conscientiously "put up."

Those residents of Charlotte and vicinity who think as far as the death of their relations and friends, will never have a better opportunity of perpetuating the resemblance and memories of those whose memories and resemblances are desirable as heir-looms and family records.

There is a branch of the United States Mint here. It is a fine building, well worth visiting for the purpose of inspecting the curious and beautiful machinery and

its manufacture of those delicious confections known as "mint drops." Judge Strange, and other gentlemanly "attaches" of the Mint will show every attention to strangers who may desire to witness the process of coining.

"Mine Host," J. H. Sadler, of "Sadler's Hotel," is a model landlord, attending to his guests in a gentlemanly and obliging manner, and furnishing his table with every delicacy within his reach. There is no better house to stop at, and no better man to stop with in North Carolina than the house and the host embodied in the name of "Sadler's Hotel" of Charlotte.

A. C. Williamson Esq., is the able editor of the "North Carolina Whig," and Mr. Waring, "a gentleman and a scholar" is about to issue a Democratic paper, to be called the "Carolina Sentinel and General Advertiser." Mr. Spring's extensive range of buildings adds greatly to the appearance and value of the town, and Mr. Williams' fine stores now in the course of erection will materially embellish the place. Take it all in all, Charlotte is a beautiful, business and flourishing town, and when it becomes the *terminus* of a railroad, will be more thriving still, but when it is made a convenience of, to run a road through it to reach a better market, it will share the fate of a man with a shovel run through him. A dead town is a doleful looking object.

The people of Charlotte have neglected their schools until their Seminaries and Academies have dwindled down to one or two little primary affairs unworthy of the place, yet honorable to their principals. Here, as elsewhere in the South, the suicidal policy of sending children away from home to be—book taught—is pursued.

It sounds so large to say, "my children are at Salem," or "Mary and Louisa are at the 'Slimey Springs Female Collegiate First Class Superficial Filigree Select Swell Head Sectarian Institute, of the Virginia Trustees Confederacy of School Patrons'." And persons called *parents* would rather gratify their vanity in this way than have their children receive that invaluable *home* education, which is of *more importance*, morally, than all the mere book learning a child is susceptible of acquiring in a dozen "sessions" of twelve months each.

The branches of a home education are,

good nature, kindness, politeness, obedience, industry, &c., but if the fashionably educated "Miss" or "Master" has a smattering of French, Music and Dancing, the parents (good angels guard the children of such parents,) are satisfied; they have "done their duty" in spending a "heap of money" in having their children "educated." How often do we see young *ladies* and young *gentlemen*, after being sent to the "Sands End Collegiate Institute," for a term of years, turned out into the world without understanding even the *decencies* which should mark the deportment of the sons and daughters of those who arrogate to themselves high positions in the "best society," and vainly suppose that *money* will hide their hoggishness from the ready and nicely discriminating eye of the *real* lady and gentleman. Let the home and school education of children (by children I mean all under age, after the old and sensible style,) be instilled together, and we shall have no more educated boors, or ill-mannered scholars annoying us with the very sight of them.

Let each town or village or settlement, "get up" and keep up *its own* schools, and its own fire-side institutions of good feelings, domestic virtues and good manners; pay good teachers liberally for the school part of their childrens' "education," and the result will be more valuable and satisfactory, and be cheaper by far in the long run. The Salem Female High School or Seminary, or something else, is all the rage about here now. I should judge from what I have heard of it that it is one of those inflated establishments where there are nearly two hundred children sent to be what they call "educated," with some five or six teachers to finish the crowd. If the teachers at Salem do justice to the multitude of children about them, they will well earn ten thousand dollars each per annum, but if they only do all they can as human beings, there will be some slighting of morals, manners and lessons at the Salem High (blown) School for young ladies. I wonder if universal reason or even common sense is to precede the "good time a coming," so prated of by the philosophers of the "galvanized squash" school. If common sense is to march in advance, the "good time" is a billion of years ahead yet. Poor children,

well may you exclaim, "save us from our friends." Charlotte sends her human contributions to the Salem education manufactory, to be worked up into fabrics of a cheap and flimsy texture, while she might have them wrought into the finest material under her own eye, and partly at home where *nature* presides (or should) as one of the teachers.

Dr. Crane, the widely and justly renowned Phrenologist, Physiologist and Physiognomist, has been lecturing here to full and well satisfied audiences. This deepest delver of all his tribe, has reached a point beyond Gall, Spurzheim or Combe. Going beyond the dread portal of the tomb, he reads the characters of the dead with no other capital (*caputal*) to work upon than the skulls of the children and great grand-children.

Subjects say, after an examination by this pourtrayer of the departed, that their fathers, mothers, grand-fathers, and great grand-mothers, were better described by Dr. Crane than they themselves could have described them.

He will tell you what kind of a month, nose and eyes your mother had, what kind of a nose, head and figure your father had, what class of diseases you are heir to, or liable to, and from which branch of the family you inherit "the ills your flesh is heir to."

He will tell you whether your grandfather was of the Huguenot stock, the Puritan or the Presbyterian, or what not. He tells you all this blind-folded: and by merely manipulating your cranium he proclaims you to be a gawky, awkward, round shouldered six footer, or an erect, graceful, elegantly formed Willis-like Adonis.

Verily, Dr. A. Crane is a man who knows more of the living and the dead "than is dreamt of in your philosophy." The doctor is a living wonder in another way, being a *consistent* man in practising the precepts he preaches. The great *ismist* would look funny practising all he preaches, and would present a very busy appearance too. But my amanuensis, "Mose,"

says my "Perry-grin-ation" No. 4, is nearly long enough, and but little has been written of interest to the daguerrean hosts who read the Journal devoted to their profession.

Mose is perfectly correct and I can only excuse myself on the score of not being posted up in daguerrean matters, because of not having received the organ of the Order of *Daguerreotypists*, as Mr. Mead would say. Mr. Johnson, Mose, Sis, the Judge and myself, are all of the opinion that Daguerrean is the prettier and most preferable title of the two, but Mr. Mead's ear may be so peculiarly fashioned as to prefer the hissing sound terminating his favorite term, to the more euphonious latter syllable *an*, so like the sweet name of a sweet girl. We think the word "stock" is decidedly on the cattle order, and would respectfully suggest as a substitute the word *materials*.

By the way, I met Mr. Martin at Spartanburg, C. H. South Carolina, some seven or eight weeks ago. Mr. Martin is industrious, persevering, and studious; his hand books being the "Photographic Art-Journal," and "The History and Practice of the Art of Photography." With more practice and a continuance of research, Mr. Martin will excel in the daguerrean art.

I hear occasionally of a sky-light gallery on wheels, moving about from place to place, and astonishing the natives, (or foreigners rather, for there are more foreigners than natives I believe in this country now). Mr. Lee drives one of these Yankee notions about, and drives a good business too. Johnson tells of a "country gentleman" who called in to have his likeness taken with a looking-glass by his side reflecting another image of him, intending to "cut that one off for Deborah." Mose thinks "the gentleman was *beside himself*."

Yours truly,

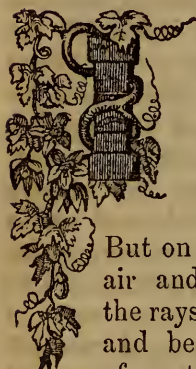
Charlotte, N. C.

WANDERER.

July, 1852.

REVIEW OF THE REPRODUCTION BY M. NIEPCE DE ST. VICTOR, OF ENGRAVED IMAGES, DESIGNED OR PAINTED.*

BY M. E. CHEVREUL.



ODINE when reduced into vapor combines with copper. The best suited combination for the success of the operation of M. Niepce, must be, according to him, of a flat and rusty color.—

But on conveying it into the open air and especially in contact with the rays of the sun, the color darkens and becomes blue like the springs of a watch, and it would appear that by the action of the sun it disengages itself from the iodine, for I smelt the odor of that body when scenting a plate of iodised metal which had just been struck by the sun. At the same time that the effect of these colors takes place under the influence of the solar light, the copper of the clear parts tarnishes upon passing to the *protonide* states. It is evident that the image of the leaf tends towards the low colors by the differences which exists between a specular and a flat surface, and there is always less opposition between the bottom seen in the first, and that in the second, than there is between the leaf seen in the first and that one seen in the second. Let us add that the color of iodised copper resembles more the color of copper by having less red. Then there are several causes for the reproduction of images by immersion.

38. *Microscopic Observations.*—When we examine with a microscope the turning platina of George Oberhauser in such a manner that it may be strongly illuminated by the sun in the iodised portion, and also in the portion where the copper is pure.

Iodised copper presents extremely delicate pictures, generally circular, some are blue and violet, others orange and yellow, these last colors predominating; but the principal color of iodised copper is yellow.

Pure Copper presents rectilinear parallel lines of a copper color, with some cir-

cular and *iris* marks. So the difference is extreme when these two effects are examined simultaneously. Only in turning the platina the optical effects of parrallel lines of pure copper by a *maximum of light and shade* can be easily proved according to the position in which they are seen, the construction as if grained by iodised copper show nothing alike.

39. The copper exposed to the vapor of fluoride of ammonia looses its color and metallic brilliancy. What occurs? I am ignorant of it yet. Be it what it may, the opposition between the reversed image and the original, produces an effect altogether analogous to that one of plate No. 1, only the difference is greater, the copper exposed to ammonia being heavier than the iodised copper, and its colors are less exact.

40. *Microscopic Observations.*—As the pure copper, if it is exposed to ammonia, presents less difference in the microscope than the iodised copper, it is because it chiefly arises from the fact that the lines are still seen in the copper exposed to ammonia.

41. The water applied to copper exposed to ammonia does not seem to take off any of its solvable matter sensible to hematine and to violet dye, at least operating comparatively with a copper plate not modified.

Water passed several times on an ammonical coating does not seem to have produced any effect when the plate is completely dry.

By rubbing the modified copper with moistened cotton it perceptibly takes a bluish green color, while it hardly produces anything on copper not exposed to ammonia. Cotton of a greenish blue color touched with acidulated cyano ferro cyanide of potassium takes a spongy chestnut color.

The solution of ferrocyanide produces no effect on the glazing. If you pour a drop of acetic acid, prosphoric acid, &c., on the glazing, the metallic copper appears sud-

* Continued from Vol. 3, No. 6, page 371.

denly and the ferrocyanide poured into acid produces an ample precipitate of a red chestnut color. The glazing has therefore been dissolved. Besides this acid retains ammonia.

Pass acid over one half of a ring exposed to ammonia, and produced on a square plate; wash this half, then touch it with tripoli; it (the half of the ring) then combines with the pure copper of the corners of the plate, while the other half which was only touched with tripoli, and pure water, always presents a distinct image of the metallic copper. This proves that an image is made to disappear by the use of acidulated water.

42. Copper exposed to the contact of iodine in the first place, and to the vapor of fluorate of ammonia, afterwards takes a brown color, which is darker than the one of No. 2, even had this (No. 2,) been exposed to air and sun.

We are ignorant of what takes place between the iodated copper and the ammonia.

43. *Microscopic Observation.* — The difference is perfectly analogous between pure copper and copper iodated first and then exposed to ammonia, as well as between pure copper and the copper only iodated, but, the copper iodated and exposed to ammonia, is more striking in its brown color and the image is more apparent.

A PLATE EXPOSED TO IODINE WITH TWO REVERSED LEAVES EXPOSED AFTERWARDS TO AMMONIA WITH A SINGLE REVERSED LEAF.

44. This plate represents more than the effects obtained by the process of M. Niepce, the reversed leaf, which I shall call pure leaf allowing a comparison between the surface of copper not modified, and the surface of copper only modified by ammonia, which surface represents the lights, and which I shall call leaf ammoniacque.

So there is this essential difference that in the second, and especially in the fourth the leaf *ammoniacque* (exposed to ammonia) appears to be lighter than the ground, while the pure leaf appears darker; but in the fourth circumstance the difference is very small.

45. A very remarkable fact, which

should be examined, is the intense resistance offered by copper modified by the contact of iodine or ammonia and by the successive contact of iodine and ammonia when the metal is submitted to rubbing with a flock of cotton impregnated with pure water and tripoli.

46. If you pass tripoli over a plate in a longitudinal direction, as soon as it shows the actions of the vapor of iodine the modification disappears and the copper submitted to the action of the ammoniacal vapor shows a homogeneous surface.

The modification which the copper has just met with by the effects of the iodine, therefore resists not to the rubbing of the moistened tripoli.

But this is different when the plate, after having been exposed to the contact of vapor of iodine, is left alone in the light for forty-eight hours. If the drawing has lost its clearness, however, by touching the plate with tripoli in a longitudinal direction, the image of the leaf is preserved, although the dull color of the ground is gone, and the ground looks like the pure copper.

If you again pass tripoli over the plate which I speak of, its surface seems homogeneous; however, by looking at it under certain inclinations in a room with black walls, you can see the leaf. After having caused every trace of an image to disappear by the use of tripoli, it can often be made to reappear by submitting the plate to vapor of ammonia. I had the occasion to prove the disengagement of the iodine in this circumstance by the smell. Last, every trace of an image can be made to disappear by a new application of tripoli.

47. The plate No. 4, passed over with tripoli, has produced the following effects: Definitely in the plate at 2, whose leaf has been reversed, the ground, notwithstanding the application of tripoli, has always looked more dull than the reversed part. In the case where the plate had only been exposed to the vapor of cold fluoride of ammonia for a few minutes, the image would disappear by rubbing with tripoli, and it might happen that a new exposure to ammonia would make it reappear.

48. The results are analogous to the preceding ones. When the reversed leaf after the exposure to the iodine has been uncovered during the exposure to ammo-

nia, there is less opposition between the leaf and the ground, than there is when the leaf has been kept from the contact

with ammonia, as it has been the case with No. 3.

TO BE CONTINUED.

A NEW THEORETICAL AND PRACTICAL TREATISE ON PHOTOGRAPHY UPON PAPER AND GLASS.

BY GUSTAVE LE GRAY.

Translated from the French by J. R. Snelling, M. D.

PREFACE.



THE immense influence which the new art of photography is called to exert upon the fine arts makes it imperative upon all *savants*, amateurs and operators, to hasten its progress by close researches and by communicating their discoveries without restriction.

Faithful to this principal, I published a year ago my first method. The rapid sale of the publication has given me the extreme satisfaction of knowing that I have attained the end which was intended; that of rendering myself useful to artists and amateurs by publishing the processes which my researches and experience pointed out as the most certain and the most practical.

This new edition will be divided into two parts. In the first, I will pursue the same plan as in the old edition. I will describe the practical method with which I usually operate, and which thus far appears to me the surest and best. I will not enlarge upon each article except so far as will be necessary to fully convey my meaning without overburdening the memory. In the second part I will draw up some general considerations, theoretical and practical, upon the chemical agents employed in photography.

I venture to hope that this edition will be received as favorably as the first, and if it should contribute in any way to the

advancement of the photographic art, my chief wish will be gratified.

PART FIRST.

Definition of some technical terms employed in Photography and in the course of this work.

§ 3. CONCENTRATION.—We mean by this the act of thickening, and of condensing by the action of heat saline or acid liquids, so as to render them more dense, more charged with a salt or acid.

CRYSTALLIZATION.—The general idea attached to the word crystallization, should be that of an operation by which a body in its passage from a fluid to a solid state assumes a regular form.

DIAPHRAGM.—Such we call the discs, pierced with openings more or less large, which we place before the object-glasses to bring together more or less the pencils of light and to modify its intensity as well as the clearness of the image.

SOLUTION.—This is an operation by which we convert a body from the solid to the fluid state, either by water or by heat. A solution may also be effected between two solid bodies by their mutual action.

DISTILLATION.—This is an operation by means of which we separate, with the aid of heat the volatile from the fixed substances.

DECANT.—This is to separate the clear and limpid liquid from the cloudy deposit which is held in solution. We decant by removing the liquid either by inclination or with the aid of a pipe or syphon.

NASCENT STATE.—To act upon a body

in its nascent state, is to employ it at the same moment of its formation, before the air and any foreign substance has had time to modify it.

NEGATIVE PROOF, NEGATIVE CLICHE, AND TYPE—In photography are synonymous expressions, which are made use of for designating the proof obtained in the camera-obscura. This proof is reverse in its character from the effect; the lights and the white parts of the positive are represented by the dark parts of the negative, and the shades and darks by the whites. Hence it is that the name of negative proof is applied, which should be the only term employed; that of *cliche* is often very improper.

POSITIVE PROOF, POSITIVE.—This expression is understood to be the opposite of the preceding, and designates the proof obtained in the natural state of light and shade by the passage of the solar rays, or even of light diffused through the negative proof. These rays being received upon a sheet of paper, sensitive and white, which the light energetically darkens, and which is placed immediately under the negative proof, we will comprehend—that where the negative is clear, and therefore translucent, light penetrates and darkens the positive paper, while on the contrary, it is arrested by the darks of the negative which precludes its transmission in proportion to their intensity, and thus the whites are reversed.

PLACE AT THE POINT.—To place the camera at the point is, to lengthen or shorten it until the image attains its maximum clearness upon the ground glass.

PRECIPITATION.—Precipitation is the separation of a body from a liquid by the adjunction of a third body, which has a greater affinity for one of these bodies than that body which first combined with it.

RECTIFICATION.—This is to render a substance purer by repeating an operation which it has already undergone.

REDUCTION.—This is an operation by which the oxides of metals repass to the metallic state.

SUBLIMATION.—This consists in the reception at the top of a vessel, of vapors from a body, which condensing, are obtained in a greater state of purity.

SATURATION, TO SATURATE.—These words are employed to designate the state

of a liquid which contains as much of a substance as it is capable of dissolving, so that an excess lies at the bottom of the vessel. Saturation, in order to be always identical, requires to be made at the same degree of temperature. The more the temperature is raised, the more does the liquid take up of the salt with which it is saturated. Water saturated with gallic acid, and chloride of sodium.

TO VOLATILIZE, TO EVAPORATE.—This is to reduce into vapor or gas substances which are susceptible thereof.

TO DRAW A PROOF.—This is to expose the sensitive paper to the luminous radiation, either by means of the camera-obscura to obtain a negative, or directly to the sun to obtain a positive.

CHOICE OF PAPER.

§ 4. The choice of paper is very important; and for the portrait especially we cannot pay too much attention to it. However, with the new method which we come to describe, this choice is less important, and papers having little body on account of their extreme fineness, as the Lacroix papers of Angouleme, become excellent.

For operating without preliminary preparation, I prefer, for the fineness of its grain and its solidity, the Waterman paper slightly glazed, twelve to twenty-four pounds per ream in weight.

The fine is the best for portraiture, and the thick for landscape and monuments.

Its sizing with gelatine renders it a little less rapid than our French papers; but for the same reason, it bears a much longer time the action of the gallic acid without being affected by it, and thus encounters an apparent delay.

Among the French papers I prefer using those of M. Lacroix, Angouleme, Rue Mazarine, No. 60, and Canson Brothers, Annonay; M. Binant, Rue de Clery, No. 7, keeps these papers at retail.

Those of M. Lacroix are the most sensitive of all; but it is necessary to select them out in order to succeed in obtaining them of a good quality with respect to sizing, which in general is not sufficiently thick. Their texture must be as close as possible.

The greatest rapidity of a paper depends upon the presence of the greatest quantity of starch.

I choose paper with reference to its transparency, rejecting all sheets which are marked with impurities and especially with spots of iron. We recognise these spots by their yellow color of rust, or by their bright metallic lustre.

A paper bearing the impress of a woof ought to be rejected, as well as that which is too much glazed, in such a manner as to be riddled, as it were, with small holes. These holes are like so many small capillary tubes into which liquids penetrate more freely, and, forming a too great reaction, occasion a crystalline deposit of the dark gallate of silver.

All sheets presenting a very uniform appearance,—like that of unpolished glass,—being collected together, I trim their edges, and then submit them to the first preparations.*

PRELIMINARY PREPARATION OF THE NEGATIVE PAPER FOR OPERATING BY THE DRY AND WET METHOD.

This preparation has for its object the complete stopping up of all the pores of the paper, by means of virgin wax, and thus rendering the paper more susceptible of receiving a uniform reaction under the influence of the different operations.

The paper thus acquires the aspect and firmness of parchment, and, after the development of the image, it presents the advantage of not needing to be waxed anew to obtain the positive proof.

§ 5. Proceed with this operation as follows: Take a large silvered plate, as for a daguerrean proof, and place it on a horizontal support, and then heat it over a spirit lamp, or better still, place it over boiling water, and then at the same time with the other hand rub it on top with a piece of virgin wax, which thus becomes melted.

When you have a fine coating of melted wax lay your paper where you can facilitate perfect adherence with the aid of a pasteboard.

When it is very uniformly imbued, remove it and place it between several sheets of very even blotting paper, over which pass an iron moderately hot in order to

carry off the excess of wax. It is very essential that the wax should be removed very uniformly and remain only in the texture of the paper. A sheet well prepared should not present in daylight any shining point at its surface, and should be perfectly transparent.

The degree of heat of the iron is sufficient when spittle simmers upon its surface without being detached. At a higher degree of temperature, it would spoil the wax and spot the paper. For this preparation preference must be given to very fine paper; that of Lacroix, Angouleme, and that of Canson Brothers, Annonay, from 6 to 7 kilogrammes per ream are very good.

§ 4. One of the principal qualities of paper thus prepared, besides its great transparency—permitting us to perceive the least bubbles of air which may exist between it and the preparations—it has also the advantage of suffering the proof to develop itself in the gallic acid for a very considerable time without staining either the proof or the acid. I have thus left the proofs in gallic acid for three entire days without any injury resulting therefrom. But, after all, its chief quality is that of permitting us to prepare the paper with the acetate of silver in advance, and thus enabling us to operate with a dry paper, preserving it good for several days. This preparation also gives the blacks very intense upon very fine papers, which we could not otherwise obtain.

The bath of iodide of potassium completely penetrates the wax and removes its greasy aspect by a kind of decomposition, so that all the succeeding preparations are applied perfectly and very equally. It is necessary to leave this paper from half an hour to an hour in the iodide bath, according to the thickness of paper, so that the wax may be perfectly decomposed. The thicker the paper is, the more time will it require.

It is also necessary, when the paper is dry to avoid bringing it near the fire before placing it on the bath of nitrate of silver, because then the wax again becoming greasy, the silver bath could not be applied equally.

After this paper has been submitted to the iodide of potassium and is perfectly dry, it has a violet tint. This tint which

* The 2d and 3d §'s of this treatise we omit here, as they have already been published in our Journal, and may be found on page 156, vol. 2.—*Ed. Pho. Art-Journal.*

is produced by a combination of iodine with wax, so far from injuring it, is an improvement, because it gives a suitable time to leave the paper upon the aceto-nitrate of silver, this time being just that which is necessary for this violet tint to disappear.

The preparations which we come to describe may be applied without distinction upon waxed paper or upon ordinary papers. In the latter instance it would be better to use papers somewhat thick.

FIRST OPERATION.

Preparation of Negative Paper.

§ 5. Boil 250 grammes of rice in a porcelain or earthen vessel containing three litres of distilled water. The rice must be only slightly swollen, in order that the liquid obtained may not be too pasty from an excess of starch, but contain only the glutinous part of the rice. Then strain the whole through a fine linen cloth. This is an excellent sizing which gives body to the paper, and very fine darks.

§ 6. To prepare the first bath in which the paper is to be soaked for the purpose of receiving the salts which must form the sensitive preparation through reaction of the aceto-nitrate of silver, you dissolve in a litre of rice water, like that which we have mentioned, the following substances:

Sugar of Milk	10 grammes
Iodide of potassium	15 “
Fluoride do.	0 “ 50 centi'g.
Cyanide do.	0 “ 80 “

When the whole is perfectly dissolved, filter through fine linen, and receive the liquid into a bottle, to be kept for use. This preparation may be preserved a very long time without suffering any change, and used until it is exhausted.

When you wish to prepare the paper, pour this solution into a large dish, and put in your paper completely, leaf by leaf, one upon another, taking care to disperse any air bubbles which may be formed, and adhere to the paper.

Put in this manner fifteen or twenty leaves at a time into the dish, and let them soak from half an hour to an hour, according to the thickness of the paper. Then turn the whole, those at the top to the bottom, and beginning with the first leaf immersed, take them out one by one and hang them up by one corner to dry with a

pin bent like the letter S, which you can hook to a cord fastened horizontally in the air. When hung up, attach to the opposite corner,—where the liquid gravitates—a piece of bibulous paper, which attracts the liquid, and facilitates the drying process.

Be careful never to mix together the English and French paper in the same basin, but prepare them separately.

The English paper contains a free acid, which therefore occasions the immediate precipitation of an iodide of starch in the French paper, and completely tints it of a deep violet color.

The paper being dry, cut it to the size of your camera, and preserve it in a portfolio for use.

As this paper is almost entirely insensible to light, it may be made in the day time. However, a very long exposure to vivid light would decompose the iodide of potassium in the starch of the paper. I think, therefore, that it would be always advisable to guard against a very bright light. This paper may answer without distinction for landscape and portrait. It admits of great modulation of tones and of very intense darks. It is, however, less quick, if it has not been waxed like the paper which I shall describe in the following chapter, and which is exclusively designed for portraits; but if it be waxed and dry it competes with it in rapidity.

The liquid which remains after withdrawing the paper is poured into a stoppered bottle and used, as I remarked, with new preparations until it is exhausted. It is sufficient merely to refilter it at the time of using. We can also,—especially when making use of paper previously waxed—add to the solution the viscous residue of two whites of eggs beaten into foam, to each litre of the preparation.

To abridge, I might call the paper being submitted to the first preparations *iodized paper*, simply.

PREPARATION OF A SPECIAL PAPER FOR THE PORTRAIT.

§ 7. Prepare in a ground stoppered bottle the following solution:

Distilled water	400 grammes
Iodide of potassium	20 “
Cyanide do.	2 “
Fluoride do.	0 “ 50 centig.

Pour two or three millimetres of this solution into a shallow pan, porcelain plate, or upon a very even glass slab surrounded with a paper border to keep the liquid from running off.

Take good French paper; Canson's, of 15 kilogrammes per ream is the best. You can easily recognize the back, as it is the side which has the appearance of canvas, while the right side is like satin.

Take a sheet of the iodized paper by two of the corners, holding them perpendicularly, the back of the paper up, and apply the right side upon the liquid, gradually depressing it until the sheet is equally spread. Repeat this operation sufficiently often to effect the expulsion of any air bubbles which may be formed; be careful also to keep the upper side of the paper from the contact of the liquid. Do not let the sheet remain upon this bath more than one or two minutes, at the expiration of which time you may remove it and dry it perfectly between leaves of blotting paper of a very fine grain, rubbing it over in every instance with the hands. Care must be taken to change the place of the paper two or three times, in order to remove the moisture very equally; then withdraw the sheet from the book of blotting paper, and pass over the surface—the prepared side—a soft brush for the purpose of carrying off the impurities which would be liable to adhere to it. This done, place the same side upon the bath of aceto-nitrate of silver, which will be found described in the next chapter, at §11; let it remain only 8 or 10 seconds at the most; and then place it immediately upon the glass of the pressure frame of the camera, having first furnished it with a piece of blotting paper well soaked in water, as I shall hereafter describe.

It is necessary to make use of this paper immediately, for its greatest sensibility depends especially upon the nascent state of the iodide of silver upon which we operate.

In Summer, from 4 to 10 seconds of exposure are required to obtain a portrait in the shade, and in Winter, from 18 to 40 seconds.

We also gain a little rapidity by absorbing the aceto-nitrate of silver with suitable blotting paper after the application of the sheet upon the holder of the camera; but this requires much dexterity and skill in order to be done very equally.

SECOND OPERATION.

Manner of giving sensitiveness to the negative iodized paper by the wet and dry methods.

§ 8. Prepare by candle light the following solution in a bottle closed with a ground stopper:

Distilled water	150 grammes
Crystallized nitrate of silver	5 “

When the nitrate of silver is dissolved, add 12 grammes of crystallizable acetic acid, and be careful to exclude this bottle from light by covering it with black paper.

This proportion is very well adapted for papers prepared in advance and intended to be used a long time after their preparation, as well by the dry as by the wet method. We ought not to make use of it more than once if we wish to insure a good proof; consequently we must not prepare any more than what is necessary to cover the sheet when operating by the wet method.

§ 9. If we operate with the sensitive preparation for the portrait or with the waxed paper which we might wish to use dry without keeping it more than four days, it would be better to employ the following proportion:

Distilled water	150 grammes
Nitrate of Silver	10 “
Crystallizable acetic acid	12 “

§ 10. *Wet method**.—When you wish to operate, pour one of these aceto-nitrates of silver upon a very level plate of porcelain or glass, nearly a millimetre in depth. I usually draw out the liquid by means of a pipette or slender tube, so as to prevent the distribution of any pellicle of dust or other impurity upon the plate which would irremediably spot the proof. It would, perhaps, be still more preferable to filter through brown paper the quantity of nitrate of silver which is required to be poured into the vessel.

For still greater security, pass over the surface of the liquid, before submitting the sheet to be prepared, a piece of white paper, in order to remove with it any impurities which might remain.

Then take the sheet of iodised paper by

* It will be better to employ for this method iodised paper simply, without being previously waxed.

two of the corners and lay one side only upon the aceto-nitrate of silver;—for the sensitive paper for portraiture the side upon which the first preparation has been applied, well spread. Raise and depress several times, so as to disperse the air bubbles.

In order to prevent the fingers from spotting the paper, I make use of a bone paper knife, which I pass under the corner of the sheet and lift it from the liquid by holding it between the knife and thumb.

Be very careful that the aceto-nitrate does not touch the back of the paper as it would produce inequalities of sensibility, and consequently spots. Let the paper thus submitted remain until the formation of the sensitive coat of cyano-fluoro-iodide of silver is perfect.

From one to five minutes are required with the ordinary paper prepared with sugar of milk, according to the temperature or the quality of paper. The English paper requires more time than the French. With paper previously waxed no longer time is necessary than what is sufficient for the disappearance of the violet color which the back of the paper at first presents. With the sensitive paper for portraits (§9), 8 to 10 seconds are at most sufficient; a greater length of time would deprive it of its sensibility.

Apply then the paper so prepared entirely wet upon a slate, over which you have first spread to receive it, a sheet of common white paper well soaked in water. We can also make use of the *planchette enbois* of the camera by taking the precaution to cover it with a slight coating of wax.

I prefer the slate to any other material for this purpose, because it has the property of preserving the dampness a longer time.

The side which has been upon the aceto-nitrate of silver should by all means be turned upwards, so as to receive the luminous radiation. The paper which we put underneath should be also free from spots of iron.

Be careful to mark the side of the glass which ought to be at the bottom of the camera, and *to keep it always inclined in that direction* when the papers are applied; if this precaution is neglected, the liquid collected at the bottom, in falling over the prepared paper, would not fail to produce

spots. The paper thus applied upon the slate will remain there nearly three or four hours without falling off, and can be placed within that time in the camera.

When I am going to take a proof at a distance, I moisten the sheet of lining paper with a thick solution of gum arabic and can thus preserve for a longer time its humidity and adhesion.

§ 11. We may also make use of two glasses between which we place the paper, as directed by M. Blanquart Evrard; but it is necessary to take great care that the plates of glass are perfectly clean, and to have them repolished if scratched. I employ for this purpose, the Joseph* paper to clean them, as well as my plates; it is much superior to linen, and absorbs liquids and impurities that adhere to it much better. I am never sparing of the Joseph paper, for I would rather use a sheet too much than be uncertain about the cleanliness of my glass.

When the sheet of lining paper adheres well to the glass, it should not be removed, but only moistened afresh with water, after which you may apply another sheet of the sensitive paper.

§ 12. *Dry Method.*—I have succeeded, with the aid of my waxed paper, in operating by the dry method with the greatest certainty of success, and have thus obtained perfect results, superior to those obtained by the wet method, much finer and with much rapidity of exposition in the camera.

The portrait itself, thus executed, succeeded perfectly well; better perhaps than with the quick process (§ 9). From twenty seconds to a minute in the shade at least are necessary: 2 or 3 seconds even might answer in certain cases. It would require therefore a great deal of time to develop the image with gallic acid; but this image would be likewise good; it would only have a contrast slightly marked between the darks and whites. In this case especially, it is absolutely essential that the gallic acid and the aceto-nitrate of silver which is added should be new and extremely pure and well filtered.

Operate as follows: take two porcelain basins a little deep; in the first put 5 or

* As this paper is probably but little if at all known in the U. S., the common blotting paper may be used instead.

6 millimetres of aceto-nitrate of silver, described at § 11, and in the second pour distilled water.

Plunge both sides of the waxed and iodised paper (§ 5 and 8) into the bath of the aceto-nitrate of silver of the first basin, and let it remain four or five minutes; then withdraw it and place it immediately in the bath of distilled water of the second basin, where you must leave it at least 4 minutes if you wish to keep the paper a very long time before using it. You can prepare in the same baths ten sheets one after the other. Finally you must lift the paper from the water, dry it between very clean and new blotting paper, and in order to preserve it, put it in a book of blotting paper likewise new. Be very careful not to leave this paper to dry by hanging it in the open air; it would not fail to become altered and would become totally black in the gallic acid. Let it dry naturally (as I direct) in a book of blotting paper, having alternatively a sheet of prepared paper and a sheet of blotting paper.

By keeping this paper thus prepared well protected from light, it may preserve its sensibility 5 or 6 days and more, before being exposed to the camera-obscura. By making use of the aceto nitrate of silver described at § 10, it may be kept good 10 or 12 days, but it is less sensitive.

This method of operating is valuable for the traveler, because it dispenses with difficult manipulations and permits him to carry with him the furnished frames of prepared sheets and a very close port-folio containing two compartments, one in which he places the prepared paper for use, the other he appropriates for the drawn proofs.

Two or three proofs of the same view should be taken so as to be certain of having a good one. In the evening or the next day and even later, we can develop, in the house, the images upon the gallic acid. It is advisable not to put more than one or two proofs at a time in the gallic acid bath. It requires no longer time for exposition in the camera than for the wet method, and it is even shorter; it is only necessary to allow of a little more time for the proof to remain in gallic acid, in order that we may add 15 or 20 drops of aceto-nitrate of silver, filtered, and not having been used.

However short may be the time of exposition to light, we ought to perfectly understand what relative time a proof should be left in the gallic acid bath in order to always obtain a good image. I am of the opinion that the image is formed from the moment that the luminous rays refracted by the object-glass come to strike the sensitive paper.

All amateurs of photography should pursue their researches in this direction and seek a re-agent which develops this image with power. Thus, to give an example, I take the same view twice at the same time. The first placed in the shade, in bad weather, 20 seconds, and the second in 15 minutes. Well, the result obtained was the same; only the first was not brought out until it had remained a day and night in the gallic acid, while the second was completely developed in an hour.

Since I have made use of this dry process, I have scarcely ever failed with a proof, I therefore particularly recommend it. Amateurs will find perhaps, in the commencement, some difficulty in its use, because it is found to differ from all the practical processes hitherto employed; but, with study and perseverance, they will be convinced of all the advantages which it presents, it will be, I hope generally adopted.

There is no need of uneasiness in regard to the dirty tint and the marbled aspect which this paper acquires under the effects of gallic acid and after it is dry: this appearance entirely disappears, after which we melt over the wax contained in the proof by exposing the negative to a proper heat. This precaution should never be neglected; it is indispensable to the quality of the proof and is superior to a new waxing.

Your operations finished, pour back the aceto-nitrate of silver into a bottle, but do not reserve it for new proofs; this would be a constant cause of failure. This old aceto-nitrate contains colored albuminous matter in suspension which would produce spots and marblings all over the proof. We render it fit for use by pouring in with it chloride of sodium (common salt). We obtain a precipitate of chloride of silver which serves to give the hyposulphite of soda the necessary quality for obtaining fine tones (§ 22).

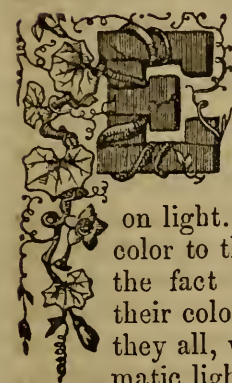
I lay it by however after having clarified it with animal black, and it thus furnishes me a body of extreme sensibility which I shall hereafter refer to.

TO BE CONTINUED.

From the London Art-Journal.

THE NATURAL PHILOSOPHY OF ART.

ON THE ORIGIN OF COLOR.



EXPERIMENT seems to have proved beyond all controversy, that color is not an inherent property of matter, but produced by the action of matter on light. That bodies owe their color to this cause is clear, from the fact that, whatever may be their color in ordinary solar light, they all, when seen in monochromatic light, exhibit the same color, which is that of the light in which they are seen.

Different opinions have been entertained respecting the nature of light. Newton and his followers supposed it to be a subtile material substance emitted from all luminous bodies, and propogated in straight lines through all homogeneous, transparent media, with enormous velocity, and impinging on the optic nerves it produces the sensation of light. This view is called the corpuscular theory. Descartes and his disciples among whom may be mentioned Hygens, Euler, Young, Herschell, on the contrary, maintain that light is caused by the undulatory movements excited by luminous bodies in the ether, diffused through space. These undulations being conveyed to the visual organs, produce the impression of light, in the same way as the aerial waves generated by vibrating sonorous bodies act on the auditory nerves, and excite the sensation of sound. There is, indeed, the closest resemblance between these two classes of phenomena. In one we have the paradox of the junction of two waves of sound producing silence, and in the other that of the confluence of two

streams of light causing darkness. This resemblance and certain other effects of the interference of light, such as the luminous "shadows" of slender wires held in small beams of light, the black spaces between Newton's rings, and the extraordinary phenomena of polarized light, are generally considered to have decided the dispute in favor of the undulatory theory.

White solar light, however, whether a material substance or merely a mode of the existence of matter, is not simple and homogeneous, but composed of several varieties of colored light. Sir Isaac Newton was the first who showed that when a sun-beam is admitted through a small aperture into a darkened chamber, and made to pass through a glass prism, and fall upon a white screen behind, it is refracted at both surfaces of the prism, and an elongated image produced, which, instead of being white as the original ray was before entering the prism, is made up of colored bands. This is called the prismatic or solar spectrum, and consists of seven colors arranged in the following order, commencing at the lower end, viz., red, orange, yellow, green, blue, indigo, and violet. These colors are not separated by well-defined boundaries, but pass into each other by imperceptible gradations, and are of unequal breadths.

Sir Isaac Newton determined by subsequent experiment, that, estimating the whole spectrum at 360°, the following are the proportional breadths of the several colored bands. By similar experiments Fraunhofer obtained slightly different results —

	Red.	Orange.	Yellow.	Green.	Blue.	Violet.
Newton	45	27	40	60	108	89
Fraunhofer	56	27	27	46	95	109

Newton proved that these colors were

due to the decomposition of white light, by recombining them into white light by means of a lens. He next insulated each ray and received them separately on a second glass prism, and found they were again refracted, but without any further alteration either of form or color. From these phenomena he inferred that white light is composed of seven homogeneous colors, each having a different and fixed degree of refrangibility; the red ray having the least and the violet the greatest. These seven colors he also considered to be primary, and all colors compounded of any two or more of them secondary.

Sir David Brewster, however, has since proved experimentally that this view of the composition of white light is erroneous. He examined the solar spectrum through a piece of blue glass similar to that used for finger glasses, and found that the yellow band increased considerably in breadth. It then extended over a part of the space before occupied by the orange band on the one side, and by the green band on the other. In other words, the blue glass absorbed the red light which mixed with the yellow to compose orange: it absorbed also the blue light which with the yellow composed green. So that instead of the orange and the green colors being simple and homogeneous, they were shown to be compound colors, the orange consisting of red and yellow, and the green of blue and yellow. Since also the constituents of these compound colors had respectively the same degree of refrangibility, it follows that difference of color is not a proof of difference of refrangibility.

By viewing the solar spectrum through various colored media, Sir David found that every part of it might be changed both in color and intensity. From these facts he was led to conclude, that "the solar spectrum consists of three spectra of equal lengths, viz., a *red* spectrum, a *yellow* spectrum, and a *blue* spectrum. The *primary red* spectrum has its maximum of intensity about the middle of the *red* space in the solar spectrum, the *primary yellow* has its maximum in the middle of the yellow space, and the *primary blue* spectrum has its maximum between the blue and the indigo space. The two points of minimum intensity of the three primary

spectra coincide at the extremities of the solar spectrum.

From this view of the constitution of the solar spectrum, the following conclusions may be drawn:—

1. *Red*, *yellow*, and *blue* light, exist at every point of the solar spectrum.

2. That as certain proportions of *red*, *yellow* and *blue* light compose *white* light the color of every point of the spectrum may be considered as consisting of the predominating color at any point, *mixed with white light*. For example, in the red space there is more red than is required to make white light with the proportions of yellow and blue in that part. In the yellow space, the yellow is, in like manner, in excess; and in the blue space, the blue ray predominates. A violet hue is imparted to blue at the higher end of the spectrum, by there being more red than yellow there.

3. White light may be obtained in any part of the spectrum by absorbing the color which is in excess at that part, and this white light is incapable of being decomposed by *refraction*, but may be resolved into its constituents by absorption.

Assuming the numerical value of white light to be 100, the following numbers represent the proportional values of the three primary colors which compose it, viz., red 20, yellow 30, and blue 50; or to represent these proportions by their lowest terms, red is 2, yellow 3, and blue 5. This theory of the constitution of the solar-spectrum and white light may be proved experimentally by coloring a circular surface with the colors of the spectrum in the same proportions above named, and then causing it to rotate rapidly, when it will appear of a uniformly white color. White light is thus shown to be a compound, of which red light, yellow light, and blue light, are the constituents. A compound of any two of these colors will, consequently, when added to the remaining one, *complete the composition of white light*, and is, therefore, called the *complementary* of that color. For the same reason every primary color may be considered as the complementary of that secondary composed of the other two. Thus red and green are complementaries of each other; yellow and purple

stand in the same relation, as do also blue and orange.

Three circles being formed by the three primitive colors, red, yellow, and blue being drawn, the spaces where any two overlap the secondary or complementary colors are produced, whilst where the whole three combine in the centre, there is white light. It will be observed that the complementary colors are opposite each other, and hence sometimes termed *opposing* colors.

The secondary colors are not of a uniform hue in the solar spectrum, in consequence of the unequal proportions of the primaries which enter into their composition; but on each border partake more of the character of that primary which adjoins it.

In the scheme of Mr. Harris the primary colors, red, yellow, and blue, are placed at the greatest distance from each other, whilst the secondaries in their most perfect state occupy intermediate positions; between these and the primaries are placed modifications of both by each other, each being on its own side considered as the fundamental color, and on the remote side as the modifier. Thus, in the mixture of red and orange, in the division nearest the red, this is regarded as the predominant hue, and orange the modifier, whilst in the division next to the orange, this color is the fundamental one, and red the modifier.

This scale will be found useful as affording a more subtle gradation and a facility of reference to the complementary of any given color in the scale. It will be observed also that the scheme is subdivided into a number of concentric spaces, in the original there are twenty, from the deepest tint in the centre, to the palest at the circumference, thus giving a change of 360 tints.

On the same principle Harris constructed a scheme of the colors and their compounds, which, from its beautifully simple yet minute analysis of them, may be interesting and useful.

In this scale the secondary colors orange, green, and purple, occupy the positions of the primaries in the preceding scheme. Excluding these secondary colors, we have 300 different tints in this arrangement, making, with the former, a comprehensive

yet simple and intelligible scheme of 660 tints. Both of the theories of light already mentioned account for the chromatic phenomena here described.

The corpuscular theory considers the primary colors as elementary forms of matter, which are the constituents of white light, and produce all the variety of colors by their different proportions in combination, in the same manner as the chemist looks upon his "elements," either in their separate state or in what he calls "binary" and "ternary" combination—the elements, calcium, carbon, and oxygen, for instance, which exists in the form of binary, or "secondary" compounds, as lime and carbonic acid; and in the ternary, or, as the colorist would say "tertiary" state, as carbonate of lime. In like manner this theory explains the decomposition of light by transparent bodies, by supposing that they attract the different colors with different degrees of force, and hence their refractions are unequal. The absorption of some particular rays, and the reflection of others which occasion the colors of opaque natural bodies, are due to the same cause, just as chemical phenomena arise from the play of contending affinities.

The undulatory theory, on the other hand, ascribes the production of colored light to the different degrees of rapidity with which the particles of æther vibrate; and thus excite distinct sensations of color through the eye, analogous to those of sound which the atmospheric undulations produce by means of the ear. As high and low tones result from the different velocities of these aerial undulations, so the different colors arise from unequal velocities with which the æther vibrates. Thus red light is produced by æther performing about half as many vibrations as are required to produce violet light; and, as these waves of colored light are propagated through space with the same velocity, the waves of red light must be twice the length of the violet waves. Newton, Fraunhofer, Fresnel, Herschell, and others, have given the lengths and velocities of the waves of all the prismatic colors. According to Newton, the lengths of these waves are for extreme red, 0·0000266th of an inch, and for extreme violet, 0·0000167th of an inch whilst the number of vibrations are for ex-

treme red, 458 millions of millions in a second, and for extreme violet, 727 millions of millions of millions in a second.

If the number of vibrations made by colored light be compared with those performed by numerous bodies, it will be found that while the lowest audible note makes 16 entire vibrations, or 32 excursions in a second, red light, the lowest "note" in the scale of colors, accomplishes 458 millions of millions in the same time. Thus it appears that, whilst the ear cannot appreciate atmospheric waves below 32 or above 1500 vibrations in a second, an interval which comprises nine octaves; the eye is limited in its perceptions to a range of undulations which include no more, than a single "octave" of colors. Allowing indigo a place in the scale as a distinct color, the analogy between musical sounds and the prismatic colors is made more striking by the annexed arrangement;—

1	2	3	4	5	6	7
c	d	e	f	g	a	b
Red.	Orange.	Yellow.	Green.	Blue.	Indigo.	Violet.

Upon this analogy, Mr. Hay, of Edinburgh, has constructed a singularly ingenious theory of the harmony of colors. When several musical notes are sounded simultaneously, either a chord or a discord is produced of which the ear is sensible: in the same manner the occurrence of two or more waves of colored light, causes the perception of a compound color, and when all the waves which generate the primary colors act together, the sensation of white light is produced. The same beautiful analogy pervades all the phenomena both of reflected sound and light; and, when we consider the uniformity and simplicity of nature's operations, this analogy seems to furnish irrefragable proof of the truth of the undulatory theory of light.

JOHN SWEETLOVE.

THE COLLODION PROCESS IN PHOTOGRAPHY FOR THE PRODUCTION OF INSTANTANEOUS PROOFS.

BY ALPHONSE DE BREBISSE.

Translated from the French by Mrs. A. L. Snelling.



SINCE the first announcement of the English journals upon employing collodion in photography, I have occupied myself continually with the preparation of this substance, by means of which I have made numerous proofs.

The frequent results that I have obtained makes it difficult for me to comprehend the ill success of which the most part of operators complain. It is astonishing that nearly a year has elapsed since the discovery of Mr. Archer has been made, and the use of collodion should not have been more widely known. We attribute this failure in popularity to

the fact that the chemists are not successful in producing this agent in the required condition. In effect, it is almost impossible to regulate its density in an invariable manner, but as to its composition, I have obtained proofs with combinations so different, with quantity so varied, that I believe it is not difficult.

At the present time some information has been published upon the employment of collodion, but the necessary details have not been given with regard to its sensitive composition. If they have not adopted with eagerness this photographic means, so precious on account of its great sensibility, it is because they always feel some repugnance to an agent of whose composition they are ignorant.

One does not know in this case to what to attribute his disappointment, nor how he can be able to prevent it.

I regard the photographic collodion, prepared in a proper manner, as the most sensitive substance that I know. It exceeds the quickness of the metallic plate, and of the most rapid albuminous preparations, even those of M. Bacot, of which we admire with good reason, the astonishing proofs representing the sea with the waves agitated, mounting and rolling upon the strand.

I have been able to obtain, instantaneously, views of places or of streets, a market day, with a compact crowd occupying themselves with commercial affairs.

The collodion is in its employment very prompt, very easy, and demands few preliminary details. The plates of glass upon which it is spread, are not required to be prepared in advance, and the cleaning is without any difficulty.

We have always desired to find for photography a paper of which the paste was homogeneous, without inequalities, without traces of tissue, and which contained a substance capable of rendering it sensitive. The collodion presents all these advantages. It is in some sort a very thin sheet of paper, only formed upon a mirror. This transparent film exceeds all kinds of paper in fineness, and it has the happy property of being so completely impregnated by the proper liquids as to give it an exquisite sensibility. I ought to remark here, that if the collodion, by its great rapidity, contests advantageously with the albuminous plates for portraits and animated scenes, it cannot be made use of with the same success for views and country places. We can only employ it dry, and, consequently, the prepared plates can only be carried a short distance. I have notwithstanding, obtained some good portraits upon the plates coated with the sensitive collodion, after having kept them an hour in the frame. In the case of the reproduction of an immovable subject, that we wish to keep several days after the exposition in the black camera, we can make it appear at our will. We ought not to be surprised, that a coating, as sensitive as that of the collodion should be preserved with more difficulty. Considered in relation to the positive proofs which it furnishes, the collodion ought to

have for portraits the preference over albumen. The *collodion* stereotype plates give to the positive proofs an aspect more softened, more mellow than the albumin plates. Their tone slightly granulated, gives to the figure the appearance of flesh. We know that the portraits upon albuminated glass have always something more decided and more dry than the proofs upon paper, which, in their turn fail in clearness. Thus the makers of portraits retouched, much prefer the proofs obtained with the negatives upon paper to those given by the coatings upon glass. The vagueness of the first permits more readily the retouches than the too hard lines of the second. I believe the collodion is preferable in the two preceding relations, for its fineness dispenses with the retouches of the pencil, which can be agreeable to the eye, but which often ends in diminishing the resemblance, and which has been, says M. Le Gray, under a false direction, injurious to the art of photography. We are assured that a complete work upon the photographic collodion, upon its composition and its employment, will be received with interest. This thought inspired me to take up the pen to arrange the numerous observations that I have noticed, and making a great number of proofs to arrive at a satisfactory result. If there is found some disorder in the lines traced in haste destined to make known the proceedings which have succeeded, and those which have failed, on account of presenting to me great obstacles, I hope that I may be excused. Desirous to conceal nothing, I have occupied myself with the care of making completely comprehensive, all that might otherwise fatigue the reader. I have always been devoted to the science of photography—that science so full of petty secrets and mysteries, and whenever I can be able to obtain some perfection, I wish to impress it upon the public. This time I hope to meet in a friendly way the lovers of the art, to cooperate in learning the uses of collodion, a substance which as yet has not been sufficiently appreciated in France. The English, directed by the instructions of the inventor, their countryman, Mr. Archer, have been able to succeed sooner than the French, as shown in London by very beautiful proofs, owing to this process.

Following these diverse operations, that I am about to explain in my little treatise, I shall give in an appendix, the translation of the most important documents which have been published in England, upon the collodion.

I repeat with much more confidence the result of the numerous experiments that have been repeated by several photographers, and among others, by one of my fellow citizens, M. Blot, with whom I have often operated, and to whom we owe some happy modifications, which will find a place in this work.

Collodion is a solution of gun cotton in sulphuric ether, to which is added a tenth part of alcohol. This solution forms a thick syrupy liquid, like honey. Its consistence is owing to the quantity of dissolved cotton. The mucilaginous nature of collodion has been the reason of its taking the place of starch, gelatine, of fish glue, of varnish, of gluten, &c., substances which have all been advantageously replaced by albumin. The first trials have been ineffectual, for they have obtained no celebrity, and it was only the last year, a little before the universal exhibition in London, that an Englishman, M. Archer, has composed a photographic collodion, of which one of his countrymen, Mr. Fry, has been the first to make successful use.

When these flasks of the prepared liquid were first sold in London, it was stated that the iodine of silver was used with it, but without showing in what manner it was introduced, nor of what it was composed.

The great difficulty which presents itself in the preparation of photographic collodion, is in obtaining the convenient density.

If we prepare the collodion by itself—which is preferable—it is necessary to procure some passed through a linen rag, in such a manner as to deprive it of the fibres of cotton which can rarely be entirely dissolved. It is easy to stretch it by adding ether or alcohol in a manner which I shall explain hereafter.

To arrive at a complete exposition of the process, I ought at first to give the means of making the powdered cotton.

PREPARATION OF POWDERED COTTON.

There are several methods of obtaining the powdered or gun cotton, of which the

most common is by immersing, during several minutes, some dry and well purified cotton, not carded, in a mixture of equal parts of English sulphuric acid, and of fuming azotic acid. Then to take away the cotton, which is washed in water, and, when dry, gives a very energetic fulminating agent.

We also arrive at an analogous result by plunging the cotton into the azotic acid.

As in the case which now occupies our attention it is useless to obtain a very fulminating cotton, of which the ballistic qualities are more or less powerful, I proceed to describe an easy preparation which has furnished me with good cotton powder, which can be fulminated by dissolving easily in sulphuric ether.

Put in a glass vase, or one of porcelain, 600 drachms of concentrated sulphuric acid—add portions of 400 drachms of saltpetre, reduce it to powder, agitate this mixture with a small glass stick, so as to form a clear pap, having a little the consistence of syrup. Into this liquid put 20 or 30 drachms of well dried cotton, not carded, plunge it in several times, so that the immersion is prompt and complete. A glass stick serves to hold the cotton in the acid, which ought to be submerged for four or five minutes. After this time, you put the impregnated mass into the water to dissolve the adherent salt; then you wash and dry the cotton in the air, or at a stove where the temperature is not too high. To hasten this result we ought to remark that the water in the cotton should be completely removed from the fibres.

Sometimes, at the moment of the immersion of the cotton in the acid, if the vase in which we operate is too straight, if the air has not been forced from it with a glass stick, it exhibits a lively effervescence and a disengagement of vapors, owing probably to the azotic acid. Hasten to plunge the whole in water to stop the effervescence which will soon decompose the cotton. In this case, it is rare that the preparation of powdered cotton is complete and then it is imperfectly soluble.

There is less danger in operating upon smaller quantities. Thus, two or three drachms of dry cotton, plunged during four or five minutes in a glass large enough to contain fifteen drachms of salt-petre mixed with twenty drachms of sulphuric acid, has

produced very satisfactory cotton powder. In these preparations, it is necessary to choose a vase so convenient that the cotton can be immediately plunged into the acid; if it is otherwise the part of the cotton which is exposed to the contact of air will obtain a quick composition.

The powdered cotton thus prepared, being washed and dried, appears to me the most convenient for the composition of collodion.

It is very difficult to determine the necessary proportions for obtaining a collodion proper for using upon glass, the powdered cotton being unequally soluble, but with a little skill, we shall obtain the necessary density.

Here are the proportions which I employ with the most advantage.

Powdered cotton well dried	1	drachm,
Sulphuric ether	90	"
Common Alcohol. (33°)	60	"

Mingle them together in a flacon; then, after some time, pass the liquid through a linen rag and preserve it with care in a close glass.

This solution gives a weak collodion being less than the convenient density. I say less, because it is impossible without some previous trials to know at what point the powdered cotton is soluble.

It is necessary to have a flask for collodion thicker, and of a more uniform density than those used for medicine; it is easy to obtain it by increasing the proportion of powdered cotton in solution. It is also necessary to pass it through linen; for this operation it is necessary to use gloves, for the fingers coated with collodion, are difficult to clean, as this substance properly dried, is tenacious. This thick preparation will strengthen the first if we perceive that it has not sufficient consistence.

TO BE CONTINUED.

LIFE OF BENJAMIN WEST.*

BY A. CUNNINGHAM.



WHILE picking up those classical crumbs, the youth was attacked by a fever. Every fresh aspect of his early life had something in it remarkable and romantic.

When good medicine and good nursing began to remove his complaint, another adversary invaded his repose. This was a shadowy illusion, which, like an image in a dream, was ever unstable, and changing shape as well as hue. It became first visible in the form of a white cow, which, entering at one side of the house, walked over his bed, and vanished. A sow and a litter of pigs succeeded. His sister thought him delirious, and sent for a physician; but his pulse had a recovering beat in it; his

skin was moist and cool; his thirst was gone, and every thing betokened convalescence. While the doctor stood puzzled about a disease which had such healthy symptoms, he was alarmed by West assuring him that he saw the figures of several friends passing at that moment across the roof. Conceiving these to be the professional visions of a raving artist, he prescribed a draught which would have brought sleep to all the eyes of Argus, and departed. As he went, up rose West, and discovered that all those visitations came through a knot hole in the shutters, which threw into the darkened room whatever forms were passing along the street at the time. He called in his sister, showed her the apparitions gliding along the ceiling, then laid his hand on the aperture, and all vanished. On recovering he made various experiments, which he communicated to Williams; who found

* Continued from Vol. 4, No. 1, page 61.

it to be what Butler calls "a new-found old invention." He produced a London *camera-obscura*; and West contented himself with the praise due to collateral ingenuity.

On returning to Springfield, his future career became the subject of anxious deliberation. Some of his best friends were in favor of his making art his profession; his mother was desirous of distinction for her youngest child, and the father, influenced by the prophecy of Peckover, at length resolved on submitting the matter to the wisdom of the Society to which he belonged.

The spirit of speech first descended on one John Williamson. "To John West and Sarah Pearson," said this western luminary, "a man-child hath been born, on whom God hath conferred some remarkable gifts of mind; and you have all heard that, by something amounting to inspiration, the youth has been induced to study the art of painting. It is true that our tenets refuse to own the utility of that art to mankind, but it seemeth to me that we have considered the matter too nicely. God has bestowed on this youth a genius for art,—shall we question his wisdom? Can we believe that he gives such rare gifts but for a wise and good purpose? I see the Divine hand in this; we shall do well to sanction the art and encourage this youth." The Quakers, persuaded by this sagacious enthusiast, or moved by the belief that the worldly fame which accompanies genius would shed a new halo on their sect, acknowledged the boy's powers upon the principle of implicit faith—gave their unanimous consent, like the "Brethren" in the Alchemist, to have their lead turned into gold, and forthwith summoned the youth, in whom so many hopes centred, before them.

He came and took his station in the middle of the room—his father on his right hand, his mother on his left, while around him flocked the whole Quaker community. It was one of the women that spake first; but the words of Williamson are alone remembered. "Painting," said he, "has been hitherto employed to embellish life, to preserve voluptuous images, and add to the sensual gratifications of man. For this we classed it among vain and merely ornamental things, and excluded it from among

us. But this is not the principle, but the misemployment of painting. In wise and in pure hands it rises in the scale of moral excellence, and displays a loftiness of sentiment and a devout dignity worthy of the contemplation of Christians. I think genius is given by God for some high purpose. What the purpose is, let us not inquire—it will be manifest in his own good time and way. He hath in this remote wilderness endowed with the rich gifts of a superior spirit this youth who has now our consent to cultivate his talents for art—may it be demonstrated in his life and works that the gifts of God have not been bestowed in vain, nor the motives of the beneficent inspiration, which induces us to suspend the strict operation of our tenets, prove barren of religious or moral effect!" "At the conclusion of this address," says Galt, "the women rose and kissed the young artist, and the men, one by one, laid their hands on his head."

That this scene made a strong impression on the mind of West, we have his own assurance; he looked upon himself as expressly dedicated to art—and considered this release from the strict tenets of his religious community as implying a covenant on his part to employ his powers on subjects holy and pure. The grave simplicity of the Quaker continued to the last in the looks and manners of the artist, and the moral rectitude and internal purity of the man were diffused through all his productions.

Being now left more to the freedom of his own will, West deviated into a course not at all professional, but for which the accommodating eloquence of a John Williamson might have conceived a ready apology. He became a soldier. The Friends had not included this among those pure and pious pursuits, which they ascribed to the future painter of history; they expressed, however, neither surprise nor sorrow for this backsliding in Benjamin, nor did they either admonish or remonstrate. He took up a musket—inspired with his enthusiasm young Wayne, afterward a distinguished officer—and joining the troops of General Forbes, proceeded in search of the relics of that gallant army lost in the desert by the unfortunate General Braddock.

To West and his companions were ad-

ded a select body of Indians ; these again were accompanied by several officers of the Old Highland Watch—the well known forty-second, commanded by the most anxious person of the whole detachment, Major Sir Peter Halket, who had lost his father and brother in the unhappy expedition. Though many months had elapsed since the battle, and though time, the fowls of the air, the beasts of the field, and wild men more savage than they, had done their worst, Halket was not without hopes of finding the remains of his father and his brother, as an Indian warrior assured him that he had seen an elderly officer drop dead beneath a large and remarkable tree, and a young subaltern, who hastened to his aid, fall mortally wounded across the body. After a long march through the woods, they approached the fatal valley. They were affected at seeing the bones of men, who, escaping wounded from invisible enemies, had sunk down and expired as they leaned against the trees, and they were shocked to see in other places the relics of their countrymen mingled with the ashes of savage bivouacs.

When they reached the principal scene of destruction, the Indian guide looked anxiously round, darted into the wood, and in a few seconds raised a shrill cry. Halket and West hastened to the place—the Indian pointed out the tree—a circle of soldiers were drawn round it, while others removed the leaves of the forest which had fallen since the fight. They found two skeletons—one lying across the other—Halket looked at the skulls,—said, faintly, “It is my father!” and dropped senseless in the arms of his companions. On recovering, he said, “I know who it is by that artificial tooth.” They dug a grave in the desert, covered the bones with a Highland plaid, and interred them reverently. This scene, at once picturesque and pious, made a lasting impression on the artist’s mind. After he had painted the *Death of Wolfe*, he proposed the finding of the bones of the Halkets, as an historical subject ; and, describing to Lord Grosvenor the gloomy wood, the wild Indians, the passionate grief of the son, and the sympathy of the companions, said, he conceived it would form a picture full of dignity and sentiment.—The subject which genius chooses for itself is, however, in most cases, the best. The

sober imagination of West had here a two-fold excitement—he had witnessed the scene, and it was American—and had Lord Grosvenor encouraged him to embody his conception, the result would, I doubt not, have been a worthy companion to the *Death of Wolfe*.

West was called from the first and last of his fields by a messenger announcing the dangerous illness of his mother. He hastened home, and arrived only in time to receive the welcome of her eyes and her mute blessing. He loved and honored her much—and when he was old and gray, recalled her looks, and dwelt on her expressions of fondness and of hope, with a sadness which he wished neither to subdue nor conceal. With the spirit of his mother, the charm seemed to have departed from his father’s house; he seldom spoke of it afterward, and soon forsook it for Philadelphia, where he established himself as a portrait-painter in the eighteenth year of his age.

His extreme youth, the peculiar circumstances of his history, and his undoubted merit brought many sitters. His prices were very low—two guineas and a half for a head, and five guineas for a half length; and the money thus laboriously earned was treasured prudently, to secure, at some future day, the means of travel and study. Young as he was, he had the sagacity to see that travel influenced the public opinion, and that study, and long study, was necessary for him if he really wished to excel. He knew that the master-works of art were in other lands, and on Rome especially he had already set his heart. So little, indeed, of the genius of the Old World had found its way to the New, that when the accidental capture of a Spanish vessel had placed a St. Ignatius of the Murillo school in the gallery of Governor Hamilton, West copied it without being either aware of its excellence or even to what style of art it pertained. A Mr. Smith admired so much the posture and sentiment of the saint, that he persuaded the young artist to paint his portrait in the same position ;—a kind of appropriation which saves time and invention, and can give little fame. With better taste he painted the *Trial of Susanna*, a work which he loved long after to talk of and describe.

From Philadelphia, after painting the

heads of all who desired it, he went to New York; with which place he was not at first much delighted. Eager traffickers from all quarters thronged her streets and quays, and the young painter was elbowed into the shade by those

“Who darkling grub this earthly hole
In low pursuit.”

Now and then, however, a merchant, after a successful bargain, sat down in the joy of the moment for his portrait; and the wandering mariner, who found markets on the rise, and gains on the increase, hung up his likeness also in the Temple of Fortune. Though art was not in high honor, West, however, found its pursuit profitable: he raised his price of a half length to ten guineas; and the spirit of amassing money seemed in a fair way of making him its own, when a letter from Smith recalled his thoughts to Italy.

The Italian harvest having failed, a consignment of wheat and flour was sent from the New World to the Old, and put under the charge of one of the Allens of Philadelphia, who offered West a passage to Leghorn. It happened that a New-York merchant, of the name of Kelly, was at that time sitting to West for his portrait, and to this gentleman the artist spoke of his intended journey, and represented how much he expected a year or two of study in Rome would improve his skill and taste. Kelly paid him for his portrait, gave him a letter to his agents in Philadelphia, shook him by the hand, and wished him a good voyage. Ere he reached his native place, after an absence of eleven months, all the arrangements for his departure had been completed by Smith; and when he presented the letter of Kelly, he found that it contained an order from that generous merchant to his agent to pay him fifty guineas—“a present to aid in his equipment for Italy.” The plodding citizens of New-York rose in the painters estimation at least fifty per cent. Two merchants in Leghorn, Messrs. Jackson and Rutherford, received him kindly, and, with introductory letters to some leading men in his pocket, he departed for Rome.

West, like most men of any imagination who visit Rome, was always fond of describing his first impressions. He had walked on while his traveling companion was bait-

ing the horses, and had reached a rising ground which offered him a view far and wide. The sun was newly risen, all was calm and clear, and he saw before him a spacious champaign bounded by green hills, and in the midst a wilderness of noble ruins, over which towered the nobler dome of Saint Peter's. A broken column at his feet, which served as a mile-stone, informed him that he was within eight thousand paces of the ancient mistress of the world, and a sluggish boor, clad in rough goat-skins, driving his flocks to pasture amid the ruins of a temple, told him how far she had fallen. In the midst of a reverie in which he was comparing the treacherous peasants of the Campagna with the painted barbarians of North America, he entered Rome. This was on the 10th of July 1760, and in the twenty-second year of his age.

When it was known that a young American had come to study Raphael and Michael Angelo, some curiosity was excited among the Roman virtuosi. The first fortunate exhibiter of this Lion from the western wilderness was Lord Grantham; he invited West to dinner, and afterward carried him to an evening party, where he found almost all those persons to whom he had brought letters of introduction. Among the rest was Cardinal Albani, who, though old and blind, had such a delicacy of touch that he was considered supreme in all matters of judgment regarding medals and intaglios. “I have the honor,” said Lord Grantham, “to present a young American, who has a letter for your Eminence, and who has come to Italy for the purpose of studying the Fine Arts.” The Cardinal knew so little of the New World, that he conceived a young American must needs be a savage. “Is he black or white?” said the aged virtuoso, holding out both hands, that he might have the satisfaction of touching at least this new wonder. Lord Grantham smiled, and said, “he is fair—very fair.” “What! as fair as I am?” exclaimed the prelate. Now the complexion of this churchman was a deep olive—that of West more than commonly fair: and as they stood together the company smiled. “As fair as the Cardinal,” became for a while proverbial.

Others, who had the use of their eyes, seemed to consider the young American as

at most a better kind of savage ; and accordingly, were curious to watch him. They wished to try what effect the Apollo, the Venus, and the works of Raphael would have upon him, and "thirty of the most magnificent equipages in the capital of Christendom, and filled with some of the most erudite characters in Europe," says Galt, "conducted the young Quaker to view the masterpieces of art. It was agreed that the Apollo should be first submitted to his view ; the statue was enclosed in a case, and when the keeper threw open the doors, West unconsciously exclaimed, "My God—a young Mohawk warrior !" The Italians were surprised and mortified with the comparison of their noblest statue to a wild savage ; and West, perceiving the unfavorable impression, proceeded to remove it. He described the Mohawks—the natural elegance and admirable symmetry of their persons—the elasticity of their limbs, and their motions free and unconstrained. "I have seen them often," he continued, "standing in the very attitude of this Apollo, and pursuing with an intense eye the arrow which they had just discharged from the bow." The Italians cleared their moody brows, and allowed that a better criticism had rarely been pronounced. West was no longer a barbarian.

Of his claim to mix with men of genius, however, he had as yet submitted no proof : he had indeed shown his drawings to Mengs and to Hamilton, but they were, as he confessed, destitute of original merit ; nor, indeed could they be commended for either neatness or accuracy. He waited on Lord Grantham—"I cannot," said he, "produce a finished sketch, like the other students, because I have never been instructed in drawing ; but I can paint a little, and if you will do me the honor to sit for your portrait that I may show it to Mengs, you will do me a great kindness." His Lordship consented ; the portrait was painted ; and, the name of the artist being kept secret, the picture was placed in the gallery of Crespigni, where amateurs and artists were invited to see it. It was known that Lord Grantham was sitting to Mengs, and to him some ascribed the portrait, though they thought the coloring surpassed his other compositions. Dance, an Englishman of sense and acuteness, looked at it closely ; "the coloring surpasses that of

Mengs," he observed, "but the drawing is neither so fine nor so good." The company engaged eagerly in the discussion ; Crespigni seized the proper moment, and said, "It is not painted by Mengs." "By whom then ?" they exclaimed, "for there is no other painter in Rome capable of doing anything so good." "By that young gentleman," said the other, turning to West, who sat uneasy and agitated. The English held out their hands ; the Italians ran and embraced him.

Mengs himself soon arrived ; he looked at the picture, and spoke with great kindness. "Young man, you have no occasion to come to Rome to learn to paint. What I therefore recommend to you is this :—Examine every thing here worthy of attention—making drawings of some half-dozen of the best statues. Go to Florence and study in the galleries ; go to Bologna and study the works of the Carracci, and then proceed to Venice, and view the productions of Tintoretto, Titian, and Paul Veronese. When all this is accomplished, return to Rome, paint an historical picture, exhibit it publicly, and then the opinion which will be expressed of your talents will determine the line of art which you ought to follow." A dangerous illness interposed, and for a time prevented West from following this common but sensible counsel. The change of scene, the presence of works of first-rate excellence, and the anxiety to distinguish himself, preyed upon him ; sleep deserted his pillow, a fever followed, and by the advice of his physicians he returned to Leghorn, where, after a lingering sickness of eleven months, he was completely cured.

Those who befriend genius when it is struggling for distinction, befriend the world ; and their names should be held in remembrance. There is good sense and right feeling in the reply of Mahomet to the insinuation of the fair Ayesha, that his first wife Cadijah was old and unlovely, and that he had now a better in her place. "No, by Alla !—there never was a better—she *believed* in me when men despised me ; she relieved my wants when I was poor and persecuted by the world." The names of Smith, Hamilton, Kelly, Allen, Jackson, Rutherford, and Lord Grantham must be dear to all the admirers of West ; they aided him in the infancy of

his fame and fortune ; they cheered him when he was drooping or desponding, and watched over his person and his purse with the vigilance of true friendship. The story of his success with the portrait of Lord Grantham found its way to Allen at Philadelphia, when he was at dinner with Governor Hamilton. "I regard this young man," said the worthy merchant, "as an honor to his country ; and as he is the first that America has sent out to cultivate the Fine Arts, he shall not be frustrated in his studies, for I shall send him whatever money he may require." "I think with you, sir," said Hamilton ; "but you must not have all the honor to yourself ; allow me to unite with you in the responsibility of the credit." Some time afterward, when West went to take up ten pounds from his agents, the last of the sum with which he had commenced his studies, one of the partners opened a letter, and said, "I am instructed to give you unlimited credit ; you will have the goodness to ask for what sum you please." It is not without cause that Mr. Galt says, "the munificence of the Medici was equalled by these American magistrates."

West, with recovered health, and a heavier purse, was now able to follow the counsel of Mengs :—he visited Florence, Bologna, and Venice. The coloring of Titian was a secret into which he strove in vain to penetrate, nor did the examination and dissection of what Italians call the "internal light" of his productions solve the mystery. Reynolds acquired the profitable secret, and kept it to himself, and many years afterward West imagined that he had obtained it too. It is doubted by some whether either ever mastered it completely. It is certain that they did not succeed in using it with the good fortune of Titian, whose coloring extinguishes all modern works as sunshine overwhelms candle-light. The pure primary colors which West afterward harmonized with the semi-tints, fall far short of the lucid splendor of Titian ; they lost by time, from which the colors of the Italian appear to gain an increase of lustre.

Having seen all that was worth seeing, West now returned to Rome. Romance and prophecy seemed to have marked the calm and serious Quaker for their own ; a fresh adventure was ready for him at

Rome. He was conversing in the British Coffee-house with Gavin Hamilton, when an old man, with a guitar suspended from his shoulder, offered his services as an improvisator bard. "Here is an American," said the wily Scot, "come to study the Fine Arts in Rome ; take him for your theme ; and it is a magnificent one."—West, who never in his life conceived what a joke meant, sat grave and steady like one of his own sitters, while the minstrel unslung his guitar, and, with a glance that told Hamilton he knew what to do, burst into song. At first he was something mystical, till he saw that his subject had a reasonable gift of credulity, and then he tried plainer words. "I behold," he sung, "in this youth an instrument chosen by heaven to create in his native country a taste for those arts which have elevated the nature of man—an assurance that his land will be the refuge of science and knowledge, when in the old age of Europe they shall have forsaken her shores. All things of heavenly origin move westward, and Truth and Art have their periods of light and darkness. Rejoice, O Rome, for thy spirit immortal and undecayed now spreads towards a new world, where, like the soul of man in Paradise, it will be perfected more and more." On the raving of this wily mendicant West bestowed both money and tears ; and even in riper years he was willing to consider this as another prophecy.

He accompanied the Abbâté Grant to see high mass performed in Saint Peter's. At the elevation of the Host, when all were silent and kneeling, a voice exclaimed in the accent of Scotland, "O Lord, cast not the kirk down on them for this abomination !" This burst of enthusiasm, in a strange tongue, was received by all, save the Scottish priest, as a lively manifestation of Catholic zeal—Grant was alarmed for his countryman, and advised him to be quiet during the rest of the ceremony, unless he desired to be torn to pieces by the religious mob. This man had traveled to Rome with a fixed resolution either to convert the Pope to Calvinism or become a martyr. He yielded for the moment to Grant's entreaties ; but next day reappeared in the same place, demanded the conversion of his holiness and the downfall of popery, and to his exceeding great joy was seized by the Inquisition, and consigned

to a dungeon. The last of the princes of that unfortunate race who sat so long, and often so worthily, on the thrones of Scotland and England, interposed and sent the resolute presbyterian home in safety.

West was not so far dazzled by those romantic occurrences as to forget his studies. He painted a picture of Cimon and Iphigenia, and another of Angelica and Medora; which confirmed the favorable opinions expressed by his friends, and opened a way to those marks of academic approbation usually bestowed on fortunate artists. Having studied the great Italian masters, and acquired much useful knowledge in the trick of color and composition, he had no wish to remain in Rome—his heart was with his native land. He, however, resolved to visit the island of his fathers, and prepared for his journey. Of Rome he has left us this brief and pithy memorandum: "Michael Angelo has not succeeded in giving a probable character to any of his works, the Moses perhaps excepted. The works of Raphael grow daily more interesting, natural, and noble."

At Parma he was elected a member of the Academy—an honor which Florence and Bologna had conferred before—and he presented them with a copy of the St. Jerome of Correggio, of such excellence that the reigning prince desired to see the artist. He went to court, and, to the utter confusion of the attendants, appeared with his hat on. The prince was no stranger to the character of the Quakers, nor to the condescension of the British law in their favor. He was, moreover, a lover of Wm. Penn. He received the young artist with complacency, and dismissed him with many expressions of regard. On reaching one of the French frontier towns, he was insulted by the populace, who considered their manufactures as ruined by the English.—Again something like prophecy mingles with the explanation of the magistrate who protected him. "The ignorant people," said he, "blame England, when they should blame our own government. But the court of France is become a band of profligates—the truly great and good are banished from the palace; this cannot last long.—Frenchmen will one day take a terrible revenge for the insults which they are doomed to suffer from those who pander to the prodigality of the court." These words were

uttered twenty-four years before the revolution. West cannot be born, nor choose his profession, nor enjoy himself in a coffee-house, nor travel through France, without the influence or accompaniment of predictions. Of French art he conceived a mean opinion. It was, said he, deficient in simplicity; an air of studied affectation was breathed over it; and the absence of the nobler spirit of painting was sought to be concealed by the petty graces and brilliancy of fine finishing.

On the 20th of June, 1763, West arrived in London: Allen, Hamilton, and Smith, his early and steadfast friends, happened to be there; they welcomed him with open arms, and introduced him to many officers of note who had heard of him in Pennsylvania. At this time he had no intention of remaining in England, nor of practising his profession for the time that he stayed. He visited the collections of Hampton Court, Windsor, and Blenheim; resided some time at Reading with Thomas West, the half-brother of his father, and looked at the vanities of Bath in the middle of its season. By degrees he began to love the land and the people. He was introduced to Reynolds; and a letter from Mengs made him acquainted with Wilson. Intercourse with artists, and an examination of their works, awakened his ambition; he consulted no one, but took chambers in Bedford-street, Covent Garden, and set up his easel. When his determination was known, his brethren in art came round him in a body, welcomed him with much cordiality, and encouraged him to continue his career as an historical painter. Reynolds was devoted to portraits; Hogarth on the brink of the grave; Barry engaged in controversies in Rome; Wilson neglected; Gainsborough's excellence lay in landscape; and the prudent American saw that he had a fair field and no opponents.

As soon, therefore, as he had finished his Angelica and Medora, he sent it, by the advice of Reynolds, to the exhibition, together with the Cimon and Iphigenia, and a portrait of General Monckton, second in command to Wolfe in the battle of Quebec. While he was employed in finishing those works, he had the good fortune to be introduced to Dr. Johnson and Mr. Burke. Johnson he admired much,

and found civil and even kind. Burke also was indulgent ; but our artist conceived there was an air of mystery about his demeanor. West at once recognised him as the brother of the chief of the Benedictine monks at Parma.

The works which West exhibited were well received ; the conception was good, and the coloring clear ; and his love of serious and solemn subjects attracted the special notice of some of the dignitaries of the church. He painted for Dr. Newton the parting of Hector and Andromache,—and for the bishop of Worcester, the Return of the Prodigal Son. His reputation rose so much with these productions, that Lord Rockingham tempted him with the offer of a permanent engagement, and a salary of seven hundred pounds a year, to embellish with historical paintings his mansion in Yorkshire. West consulted his friends concerning this alluring offer—they were sensible men—they advised him to confide in the *public* : and he followed, for a time, their salutary counsel.

This successful beginning, and the promise of full employment, induced him to resolve on remaining in the Old Country. But he was attached to a young lady in his native land—absence had augmented his regard, and he wished to return to Philadelphia, marry her, and bring her to England. He disclosed the state of his affections to his friends, Smith and Allen ; those gentleman took a less romantic view of the matter, advised the artist to stick to his easel, and arranged the whole so prudently, that the lady came to London accompanied by a relation whose time was not so valuable as West's—and they were married on the 2d of September, 1765, in the church of St. Martin's in the Fields. As he was a man without violent passions, and something cold and considerate, he made perhaps but an indifferent figure as a lover ; his wife, however, was kind and obedient, and their fireside had repose and peace.

Dr. Drummond, the Archbishop of York, a dignified and liberal prelate, and an admirer of painting, invited West to his table, conversed with him on the influence of art, and on the honor which the patronage of genius reflected on the rich, and opening Tacitus, pointed out that fine passage

where Agrippina lands with the ashes of Germanicus. He caused his son to read it again and again, commented upon it with taste and feeling, and requested West to make him a painting of that subject. The artist went home, it was then late, but before closing his eyes he formed a sketch, and carried it early next morning to his patron, who, glad to see that his own notions were likely to be embodied in lasting colors, requested that the full size work might be proceeded with. Nor was this all—that munificent prelate proposed to raise three thousand pounds by subscription, to enable West to relinquish likenesses and give his whole time and talents to historical painting. Fifteen hundred pounds were accordingly subscribed by himself and his friends ; but the public refused to co-operate, and the scheme was abandoned.

The Archbishop regarded the failure of this plan as a stigma on the country ; his self-love too was offended. He disregarded alike the coldness of the duke of Portland and the evasions of Lord Rockingham, to whom he communicated his scheme—sought and obtained an audience of his Majesty, then young and unacquainted with cares—informed him that a devout American and Quaker had painted, at his request, such a noble picture that he was desirous to secure his talents for the throne and the country. The King was much interested with the story, and said, “ Let me see this young painter of yours with his Agrippina as soon as you please.” The prelate retired to communicate his success to West.

Now all this happened to be overheard by one of those officious ladies who love to untie the knots of mysteries, and anticipate the natural disclosure of all secrets. Away flew her ladyship to the house of the artist—refused to disclose either her name or condition, acquainted him with the application of Drummond and the kindness of the King, and retired. She was not well away till a gentleman came from the palace to request West's attendance with the picture of Agrippina. “ His Majesty,” said the messenger “ is a young man of great simplicity and candor ; sedate in his affections, scrupulous in forming private friendships, good from principle, and pure from a sense of the beauty of virtue.” Forty

years' intercourse, we might almost say friendship, confirmed to the painter the accuracy of these words.

The King received West with easy frankness, assisted him to place the Agrippina in a favorable light, removed the attendants, and brought in the Queen, to whom he presented our Quaker. He related to her Majesty the history of the picture, and bade her notice the simplicity of the design and the beauty of the coloring. "There is another noble Roman subject," observed his Majesty, "the departure of Regulus from Rome—would it not make a fine picture?" "It is a magnificent subject," said the painter. "Then you shall paint it for me," said the King. He turned with a smile to the Queen, and said, "The Archbishop made one of his sons read Tacitus to Mr. West, but I will read Livy to him myself—that part where he describes the departure of Regulus." So saying, he read the passage very gracefully, and then repeated his command that the picture should be painted.

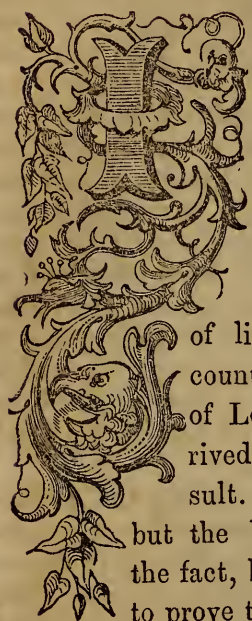
West was too prudent not to wish to retain the Sovereign's good opinion—and his modesty and his merit deserved it. The palace doors now seemed to open of their own accord, and the domestics attended with an obedient start to the wishes of him whom the King delighted to honor. There are minor matters which sometimes help a man on to fame; and in these too he had his share; West was a skillful skater, and in America had formed an acquaintance on the ice with Colonel, afterward too well known in the colonial war as General, Howe; this friendship had dissolved with the thaw, and was forgotten, till one day the painter, having tied on his skates at the Serpentine, was astonishing the timid practitioners of London by the rapidity of his motions and the graceful figure which he cut. Some one cried "West! West!" it was Colonel Howe. "I am glad to see

you," said he, "and not the less so that you come in good time to vindicate my praises of American skating." He called to him Lord Spencer Hamilton and some of the Cavendishes, to whom he introduced West as one of the Philadelphia prodigies, and requested him to show them what was called "The Salute." He performed this feat so much to their satisfaction, that they went away spreading the praises of the American skater over London. Nor was the considerate Quaker insensible to the value of such commendations; he continued to frequent the Serpentine and to gratify large crowds by cutting the Philadelphia Salute. Many to their praise of his skating added panegyrics on his professional skill, and not a few, to vindicate their applause, followed him to his easel, and sat for their portraits.

While West was painting the Departure of Regulus, the present Royal Academy was planned. The Society of Incorporated Artists, of which he was a member, had grown rich by yearly exhibitions, and how to lay out this money became the subject of vehement debate. The architects were for a house, the sculptors for statues, and the painters proposed a large gallery for historical works, while a mean and sordid member or two voted to let it lie and grow more, for it was pleasant to see riches accumulate. West, who happened to be a director, approved of none of these notions, and with Reynolds withdrew from the association. The newspapers of the day noticed these indecent bickerings, and the King, learning the cause from the lips of West, declared that he was ready to patronise any association formed on principles calculated to advance the interests of art. A plan was proposed by some of the dissenters, and submitted to his Majesty, who corrected it, and drew up some additional articles with his own hand.

TO BE CONTINUED.

GOSSIP.



T will be recollected that in our February, 1852, number, we expressed the belief that we should live to see the day when photographic pictures would be taken the full size of life. Our enterprising countryman, Mr. Mayall, of London, has already arrived at this remarkable result. We have seen nothing but the bare announcement of the fact, but the fact is sufficient to prove that the assertion made by many of our operators two years ago, that the Daguerrean Art had arrived at its ultimatum of perfection, and was incapable of further improvement, was as shallow as their brains. There are yet many things to be discovered in the art that will astonish even the friends to its improvement, as well as the lazy mechanical manipulators who abound in the United States, and who are satisfied to suffer the European photographers and savans to be formost in all the valuable discoveries made.

We were much struck the other day by a characteristic—characteristic with daguerrean artists generally—remark made by a New York operator, which clearly shows the definition applied to the word *improvement* when used by the “*professors*” of the art. We asked the question—

“Well, how prospers the American Daguerrean Association? We have not heard much about it lately.”

“Oh!” was the reply; “I have not taken any active part in it lately. I joined it in order to endeavor to *raise the price of*

pictures, but as that could not be done, I don’t care much about it.”

Now, here is a short sentence that speaks volumes, upon the true nature of those engaged in the business, and it can be of little wonder that no decided improvements emanate from them. Their whole minds are absorbed by the hope of gain, and being obscured by the shadows of golden dollars, they can see nothing else, nor can they comprehend the advantage to be derived from originating a new and important improvement.

Among all the inventions in photography that have made the world stare, during the last two years, how many have emanated among American photographers? Not one. All, all, are content to follow and copy after those of Europe. None have the ambition to distinguish themselves by a positive or practical invention, or even improve upon the suggestions of others. Where is there an operator who takes better portraits than did Mr. Anthony six or eight years ago? We know that the best daguerreans in the world are Americans, find them where you may; but who made them so? Not themselves, but Europeans! They owe every thing to the French and English savans, and it is a shame to the American character, so preeminently inventive in all other branches of industry.

While penning all our articles on this subject, we have the words, “experiments are so expensive,” continually ringing in our ears. This is the bug-bear to many a man of talent, fully capable of working out a problem in the art, which otherwise might rise up to give him an enviable renown and a sure competency. Experiments *are* expensive, but would it not show

more of the man to spend a few dollars a year in this way than so much in flimsy display and sensual pastime? for we know of no class of men, as a body, who squander more—in proportion to their means—upon the follies and vanities of this world than the daguerrean artists of this country; they are certainly as a class preeminently frivolous and gay, spending more in one year upon the unstable pleasures of life than the European savans do in ten upon their valuable and successful experiments. A few of our operators have saved handsome fortunes; why could not a little of this have been devoted to the art itself? But why should we multiply questions, there is an apathy existing which neither ambition, self-respect, or want of reputation seems to move.

— It is extremely difficult for an editor to please all his readers, and we know of no subject more harrassing than that of the Hilloype. It is a subject belonging to the public, made their property by the announcement of its author to them through the public prints, and it is no longer our duty to keep silent on the subject. We should gladly have dropped it long since, but every attempt to do so has been met by the anxious inquiries of our readers, as well as by the studied attempts of Mr. Hill to keep its memory fresh in the minds of the people by his statements in the various country papers. We agree with some of our friends that silence on the subject would be the better course, until Mr. Hill had published his readiness to impart his process to others, but we would ask them if this silence can be observed, in justice to the community of daguerreotypers, who assert that they are greatly injured by the course of Mr. Hill, so long as he persists in fulminating his rights and grievances among the people, through the country press. Let him keep silence and we pledge

ourselves to observe the most profound obliviousness in regard to him and all his works. While some men censure us for saying so much in regard to this matter, there are others, who, like *Oliver Twist*, are continually crying out for more; and these last we must say are greatly in the majority. It is a fixed fact that photographs have been obtained permanently; M. Niepce de St. Victor has established it, and not only asserted it, but has shown the result of his labors to many of the first savans of Europe, who bear testimony to its actuality. Why, therefore, should we doubt that Mr. Hill may have obtained similar results. For one, we do not, but—as we have said before—we do doubt *his* ability to make his discovery of any practical benefit. M. Victor is a far more learned man, and if his experiments, followed for years, have failed, nothing but the merest accident will ever place it in Mr. Hill's power to say, "it is accomplished." We are an American in every sense of the word; our pride as an American would be exalted by the perfection of this discovery by one of our countrymen, in advance of the united wisdom of all Europe, so much our senior in arts and sciences, no matter by whom effected, and we would be one among the first to subscribe for the presentation of a gold medal to Mr. Hill upon his establishing the fact without cavil that he had really perfected his discovery.

Mr. Lawrence has written to us denying that he ever gave Mr. Hill a certificate, or that he was ever solicited to do so by Mr. Hill. He must, however, excuse us for saying, in answer to his query, that he would act just as we have done had he even half the amount of work to accomplish in twenty-four hours that we have. We had no intention of disparaging him in the estimation of the public; we have had no reason to do so, but have always

found him a man of liberal and gentlemanly views, and one who is an example to his fellow artists.

— We had a casual glimpse of a notice to one of its members, of a meeting of the AMERICAN DAGUERREAN ASSOCIATION, to be held some evening during the present month. It would seem by this that this *secret* society is still in existence, and although we are denied the slightest insight into its proceedings, and thereby unable to promote its welfare; we are glad to hear it. It shows that there is still some self-respect among the daguerrean artists, but we are at a loss to conceive why they should so studiously endeavor to keep from our readers their very existence. Notwithstanding their unfriendliness towards us we give them the benefit of this article gratis.

— Mr. Gurney has purchased the Whitehurst gallery in the city of New York, and we have no doubt that it will vastly improve under the guidance of this veteran of the art.

— Messrs. J. H. Fitz Gibbon, and E. Long, of St. Louis, are now at the east enjoying a few weeks respite from their arduous duties. We have seen some specimens of their taste and skill, and are not surprised at their popularity.

— The Brothers Webster, of Louisville, Ky., are not only highly successful in copying the human face divine, but they succeed most happily in affecting the risible qualities of the people, among whom they have settled, by their quaint and original system of advertising.

— Messrs. Cook & Carey, have returned to the North for the summer. The first is rusticated in New Jersey, while the latter is making the citizens and “*citi-*

zenesses” happy by pursuing his pleasing art in Bridgeport, Conn.

— Messrs. Richmond & Hawkins have removed to the city of New York and taken the rooms formerly occupied by Mr. Allen, 308 Broadway. The specimens exhibited by these artists must commend them to the attention of the public and secure for them a fair share of patronage.

— FRENCH AND GERMAN LENSES.—
Let us first put the question, are the German lenses really superior to the French? Many say that they are; some of the most experienced and competent say to the contrary. M. de Brebisson, among others, gives the preference to the lenses made by M. Charles Chevalier. As French lenses cost much less, they are found everywhere and in large numbers; one must be almost rich to be able to obtain a German lens of any size, and generally they are only to be found in the rooms of *amateurs* or of artists that have much patronage. But the truth is, that when these latter wish to do something out of the common, and operate rapidly and surely, they always make use of their German lens, which is their main stay, and lay aside their French one. Is not this enough, of itself, to put out of dispute their relative incontestable superiority?

German lenses, as they are at present offered for sale at exclusive prices, are not, however, it is to be imagined, the *ne plus ultra* of optics, and we therefore think it expedient to publish the necessary improvements that should actually be put into effect.

1. German lenses have a focus much too short, and the difference between the action of the centre and of the circumference is by far too great. They seem made expressly for portrait-taking, and when it is required

to take images at a great distance, they are useless.

2. German lenses, in taking landscapes or buildings, can only give very small images, and there is no artist who has not regretted a thousand times, when he has pointed his instrument at a building, the impossibility of changing at will the size of the image, without displacing his camera.

3. German lenses have too contracted a field, and it is impossible, as is the case with all known lenses, to take a panoramic view without having recourse to the ingenious instrument—but, in truth, expensive and of difficult employment—invented by M. Martens, and constructed by M. Lerebours.

In short, what is required to answer the necessity of photographers are lenses that will allow of obtaining images of larger or smaller size while remaining always at the same distance from the object, (the distance the most suitable for an image, conformably to the rules of the art,) by a simple and very slight extension of the camera; that evidently have the same power of action at the circumference and the centre; that will, without any movable appendage, or its being necessary to use a diaphragm, to bend or to turn the sensitive plate, give at once the image of at least a third of the horizon, or of a part of a circle, of 120 degrees; so that the whole horizon may be embraced in three operations.—*Cosmos*.

—EASY METHOD OF PROCURING A CONCENTRATED SOLUTION OF IODINE.—Put into a common bottle two thimblesful of hyposulphite of soda and a rather larger quantity of iodine, so that there may be more than sufficient. Add to it about 40 ounces of common water (heated to 60 or 70 degrees), by little and little, moving the bottle, to warm it, for fear of breaking.

After shaking it a short time, the water is rapidly and strongly colored. The solution should be poured into a bottle with a ground stopper, and when cool used for iodizing.

— PROCESS FOR FIXING COLLODION PROOFS.—Dissolve some hyposulphite of soda in water, in the proportion of one to five, and add alcohol until the solution is well saturated; as well as a few drops of acetic acid. When the proof has acquired the desired tone, take it out of the solution and wash it in water for several minutes, until there remains no trace of alcohol on the paper. When the bath has been used for several proofs, a little alcohol must be added, to keep up the same degree of saturation.

— We commence this month two more valuable works on photography; that by M. Le Gray, and one—the first published—on the recent discovery and application of collodion to the art. Both these works are valuable and deserving the most careful study of our readers.

— It will be perceived by reference to Mr. Anthony's prize offer (again published in this number) that he has made several modifications, at once felicitous and judicious. We must be excused, however, for giving vent to our feelings, in expressing the view that excluding the clause regarding Photographic Societies, was suggested by a set of shallow-minded individuals who are unable to appreciate the pure and elevated sentiments which dictated its insertion, and we venture to assert that not one of them dare compete for the prize.

Their not having facilities for becoming members of a society is all nonsense, as nothing but a foolish opposition, or an innate sense of unworthiness can possibly prevent.

— We have received an anonymous communication from a person in Syracuse, professing to be a citizen of that place, in answer to a communication published in our June number. We must say to the writer that we publish no communications, particularly of the abusive nature of the one in question, without knowing its author. A dignified mealy article, and a scurilous tirade are very different affairs, and there is just this difference between the article published by us and the one sent as a reply.

— C. is informed that the attempt to publish a Photographic Album has thus far proved a failure; too few among our daguerreotypists have come forward to make the venture a successful one. We must say in reply to other portions of C's communication that our American daguerreans are the slowest set of mortals to comprehend the interests of their art that we have ever had the fortune to mingle with. Too much wrapped up in self they appear afraid of all attempts to advance their art generally. They seem to fear that in lending their personal aid they will by some means aid a fellow artist to a round of the ladder of fame above their own. We are grieved at this, and we have endeavored for the last two years to correct this unnatural feeling, but—with few exceptions—our labors have been in vain. Another year may bring forth better results; we sincerely trust it may.

* * * We have a few beautiful Photographs, by M. Evrard of Paris—copies of Monuments, celebrated Statues, Buildings, &c.—Price \$4.00 each. Address the editor, H. H. Snelling.

PREMIUM FOR THE BEST DAGUERREOTYPE.—One year since I offered a reward of *five hundred dollars* for the greatest improvement that should be made in the photographic art during the year 1851. No applications of any importance were made for it, probably in consequence of the

natural modesty of inventors. Inasmuch, however, as the money has been offered, I consider that it no longer belongs to myself but to the Art. Therefore, with the advice and consent of Professor Renwick, Morse and Draper, who were appointed the judges in the matter. I have decided to invest the above amount in a MASSIVE SILVER PITCHER, of appropriate design, to be awarded as a prize for THE BEST FOUR DAGUERREOTYPES that shall be offered for competition previous to November 1st, 1853.

No competitor will be allowed to exhibit more than one Daguerreotype of each size.

The Daguerreotypes offered for competition must be on what is called the full, two-third, half and quarter sizes.

After the decision of the judges the pictures will again become the property of the artists who made them, and be returned as may be directed.

A description of the method of operating in the production of the picture offered, must accompany each picture, mentioning the brand of plate and the makers of the various chemicals used, as far as the operator may be able to tell.

In order that there may be no complaint as to partiality, the pictures must be sent anonymously, accompanied by a sealed package containing the name of the artist and the method of operating. The pictures and sealed envelopes will be marked with corresponding numbers in the order of their reception, and the latter will only be opened after the decision of the judges.

As this prize is offered as a test of the skill of manipulators and not the excellence of the camera, no instrument larger than the regular full size must be used. Daguerreotypes taken by the mammoth camera will be excluded.

Artists of all countries are invited to send pictures for competition.

All letters of enquiry upon the subject will receive prompt attention, and it is earnestly hoped the competition will be as spirited as possible.

All who intend to compete for the prize should send in their names as early as possible, as lists of the competitors will from time to time be published.

The pictures must be forwarded to my address, free of expense.

E. ANTHONY.

THE
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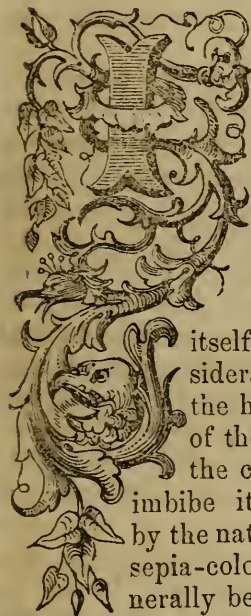
PHOTOGRAPHY.*

BY ROBERT HUNT.

PROFESSOR OF MECHANICAL SCIENCE IN THE MUSEUM OF PRACTICAL GEOLOGY,

AUTHOR OF

"RESEARCHES ON LIGHT," "THE POETRY OF SCIENCE," ETC.



N these pictures there is a curious and beautiful variety in the tints of color they will occasionally assume, varying from a rich golden orange to purple and black. The effect depends in a great degree upon the paper itself; but it is modified considerably by the strength of the hyposulphite, the length of the time exposed to it, by the capacity of the paper to imbibe it, and partly, perhaps, by the nature of the light. Warm sepia-colored pictures may generally be obtained by drying the paper, by pressure, and making it imbibe the hyposulphite supplied in liberal quantity.

The paper of "I. Whatman, Turkey Mill," seems to give pictures of the finest color, and, upon the whole, to answer best for the purpose.

If the chemical agents employed be pure, the operator, who keeps in view the *intention* of each separate process, and either adopting the manipulation recommended, or improving upon it from his own resources, may rely with confidence on a satisfactory result.

This Calotype paper is so exceedingly sensitive to the influence of light, that very

beautiful photogenic copies of lace, feathers, leaves, and such like articles, may be made by the light of a common coal gas flame, or an Argand lamp. The mode of proceeding is precisely that described for obtaining the ordinary photogenic drawings by daylight, only substituting the Calotype paper, which should be damp for the common photogenic.

When exposing the prepared paper to the light, it should be held about four or five inches from the flame, and the time required will be about three minutes.

But little remains to be added to this very clear and satisfactory description of the Calotype process; to which, indeed, is mainly due the perfection to which it has arrived both at home and abroad.

There are, however, a few modifications which must be noticed, as tending to simplify the details in some cases and to improve the general effects in others. In the main, however, it will be found that Mr. Cundell's process of manipulation is almost as good as any that can be adopted: and that gentleman certainly merits the thanks of the patentee, and of all photographic artists.

Many modifications of Mr. Talbot's mode of manipulating have been introduced with very variable advantages. I have, however, found that nearly every variety of paper requires some peculiar method to excite it to its maximum degree of sensibility. This peculiarity in the papers of different manufacturers was first noticed by Sir John Herschel. A few of the published methods may be noticed, as under

* Continued from page 85, Vol. 4, No. 2.

different circumstances they may prove useful.

Mr. Robert Bingham, who has operated with such success, adopts the following process :

Apply to the paper a solution of nitrate of silver, containing 100 grains of that salt to 1 ounce of distilled water. When nearly, but not quite dry, dip into a solution of iodide of potassium, of the strength of 25 grains of the salt to 1 ounce of distilled water, drain it, wash it, and then allow it to dry. Now brush it over with acetate of silver, made by dissolving 50 grains of nitrate of silver in one ounce of distilled water, to which is added one-sixth its volume of strong acetic acid. Dry it with bibulous paper, and it is now ready for receiving the image. When the impression has been received, it must be washed with a saturated solution of gallic acid, and exposed to a steam heat, a jet of steam from the spout of a tea-kettle, or any convenient vessel. The image will be gradually brought out, and may be fixed with hyposulphite of soda. It will be observed that in this process the solutions of nitrate of silver and of gallic acid are not mixed before application to the paper, as in Mr. Talbot's process.

Mr. Channing, of Boston, very much simplified the Calotype process. He directs that the paper should be first washed over with 60 grains of crystallized nitrate of silver, dissolved in 1 ounce of distilled water, and when dry, with a solution of ten grains of the iodide of potassium in one ounce of water : it is then to be washed with water, and dried between folds of blotting paper : the sensibility of the paper is said, and correctly, to be much improved by combining a little chloride of sodium with the iodide of potassium : 5 grains of the latter salt,

and rather less than this of the former, in an ounce of water may be employed advantageously.

To use this paper of Mr. Channing's, where time is an object, it is necessary to wash it, immediately before it is placed in the camera-obscura, with a weak solution of nitrate of silver, to which a drop or two only of gallic acid has been added. The picture is subsequently developed by the gallo-nitrate of silver, as already described.

Blanquart Evraud, Sagnez, and some others, have recommended that in the preparation of the highly sensitive photographic papers no brushes should be employed. They pursue the following plan : the solutions are poured upon a perfectly flat piece of glass, and the paper carefully drawn over it, and, if necessary, pressed closer by another plate of glass.

A plan of iodizing paper has been proposed by Mr. Jordan, which offers many advantages. Iodide of silver is precipitated from the solution of the nitrate by iodide of potassium, and this precipitate being lightly washed is re-dissolved in a strong solution of the latter salt. This solution is applied to the paper, and the paper allowed to dry ; after this it is placed face downwards upon some clean water ; the iodide of potassium is removed by this, and a pure iodide of silver left on the paper. Martin uses the spirits of wine after the picture has been developed, to improve the tone of the picture.

M. A. Martin, who is aided by the Imperial Academy of Sciences of Vienna in his endeavors to improve the photographic processes, and render them available to the purposes of art, has published the following as the best proportions in which the solutions should be made, and the order of their application.

For the negative picture—

<i>First.</i> Iodide of potassium	$\frac{1}{2}$ oz.
Distilled water	10 ozs.
Concentrated solution of cyanide of potassium	} 7 drops.
<i>Second.</i> Nitrate of silver	
Distilled water	7 drachms.
Strong acetic acid	10 ozs.
<i>Third.</i> A concentrated solution of gallic acid.	2 drachms.
<i>Fourth.</i> Good spirits of wine.	

<i>Fifth.</i> Hyposulphite of soda.	1 oz.
Distilled water	10 ozs.
For the positive pictures—	
<i>First.</i> Chloride of sodium	168 grains.
Distilled water	10 ozs.
<i>Second.</i> Nitrate of silver	1 oz.
Distilled water	10 ozs.
<i>Third.</i> Hyposulphite of soda	1 oz.
Distilled water	10 ozs.

Nitrate of silver 30 grains, dissolved in $\frac{1}{2}$ oz. of distilled water, to be poured into the solution in a small stream, while it is constantly stirred with a glass rod.

Martin particularly recommends the application of the iodine salt first to the paper, drying this, then applying the argentine solution, and drying rapidly. I have urged the necessity of this on several occasions: the advantages are, that the iodide of silver is left on the very surface of the paper ready for the influence of the slightest chemical radiation.

The use of organic matter in facilitating the change of the silver salts very early engaged the attention of Sir John Herschel; and from time to time, following his suggestions, others have employed various organic matter, albumen and gelatine being the favorite substances. These have been principally used for the purpose of spreading photographic preparations on glass—which we shall have particularly to describe: at the same time they are stated to have been employed with much advantage on some paper by photographers. For the negative pictures, Gustave Le Gray gives us the following directions and particular information:—

First Operation—Dissolve three hundred grains of isinglass in one pint and three quarters distilled water (for this purpose use a water bath).

Take one half of this preparation while warm, and add to it as follows:—

Iodide of Potassium	200 grains
Bromide of ditto	60 “
Chloride of Sodium	34 “

Let these salts be well dissolved, then filter the solution through a piece of linen, put it, still warm, in a large dish, and plunge in your paper completely, leaf by leaf, one on the other, taking care to prevent the air-bubbles from adhering to the paper.

Put about twenty leaves at a time into the dish, then turn the whole, those at the top to the bottom, then take them out one by one, and hang them by one corner with a pin bent like the letter S, to dry spontaneously.

When hung up, attach to the opposite corner a piece of bibulous paper, which will facilitate the drying.

When the paper is dry, cut it the size required, and preserve it in a folio for use; this paper may be made in the day-time, as it is not sensitive to light.

The bromide does not, in this case, act as an accelerator, as it does on the silver plates of the daguerreotype, because, instead of quickening, it retards the operation a little; its action is to preserve from the gallic acid the white of the paper, which would blacken more rapidly if you employed the iodide of potassium alone.

Second Operation.—Prepare, by the light of a taper, the following solution in a stoppered bottle: distilled water, 6 fluid ounces, crystalized nitrate of silver, 250 grains.

When the nitrate is dissolved, add 1 ounce of crystalizable acetic acid; be careful to exclude this bottle from the light, by covering it with black paper. This solution will keep good until the whole is used.

When you wish to operate, pour the solution upon a porcelain or glass slab, surrounded with a glass or paper border to keep the liquid from running off. I usually take the solution out of the bottle by means of a pipette, so as to prevent the distribution of any pellicle, or dust or other impurity from being distributed over the glass slab.

Take a sheet of the iodized paper by two of the corners, holding them perpendicularly, and gently lower the middle of the paper upon the centre of the slab; gradu-

ally depress until the sheet is equally spread; repeat this operation several times until the air-bubbles disappear; take also the precaution to keep the upper side of the paper dry.

In order to prevent the fingers from spotting the paper, pass a bone paper knife under the corner of the sheet, to lift it from the slab between that and the thumb.

Let the sheet remain upon the slab until the formation of the chloro-bromo-iodide of silver is perfect.

This may be known by the disappearance of the violet color which the back of the paper at first presented; it must not be left longer, otherwise it would lose its sensitiveness.

The time required to effect this chemical change is from one to five minutes, depending upon the quality of the paper.

Spread upon a glass, fitted to the frame of the camera, a piece of white paper well soaked in water; upon this place the prepared sheet, the sensitive side upwards.

The paper which you place underneath must be free from spots of iron and other impurities.

It is also necessary to mark the side of the glass which ought to be at the bottom of the camera, and to keep it always inclined in that direction when the papers are applied; if this precaution is neglected, the liquor collected at the bottom, in falling over the prepared paper, would not fail to produce spots. The paper thus applied to the glass will remain there for an hour without falling off, and can be placed within that time in the camera.

When I am going to take a proof at a distance, I moisten the sheet of lining paper with a thick solution of gum arabic, and thus preserve for a longer time its humidity and adhesion. I can also in this case make use of two glasses between which the paper is placed, according to the direction of M. Blanquart Evrard; but it is necessary to take great care that the plates of glass are perfectly clean, and to have them re-polished if scratched.

I employ for this purpose, blotting paper to clean them, as well as my plates; it is much superior to linen, and absorbs liquids and impurities that adhere to it. I never spare the blotting paper, for I would rather use a leaf too much than be uncertain about the clearness of my glass.

When the sheet of lining paper adheres well to the glass, it should not be removed, but only moistened afresh with water, after which you may apply another sheet of the sensitive paper.

In preparing several sheets of the sensitive paper at a time, it is not necessary to wash the slab for each sheet; you need only draw over it a sheet of white paper, to remove any dust or pellicle formed.

When your operations are finished, you may pour back the aceto-nitrate of silver into a bottle, and reserve it for another time.

The necessity of employing M. Gray's papers in a wet state is their most objectionable quality, but certainly the results obtained by strict attention to his directions are often exceedingly beautiful. For developing the image the following is recommended, which does not, however, differ essentially from the developing processes already described.

Make about a pint bottle of saturated solution of gallic acid having acid in excess and using distilled water; decant a portion into a smaller bottle for general use, and fill up the other bottle; you will thus always have a clear saturated solution.

Pour upon a slab of glass kept horizontal, a little of this liquid, spreading it equally with a slip of paper, then apply the paper which has been exposed in the same manner as described for the negative paper, being careful to keep the back dry. Watch its development, which is easily observed through the back of the paper; you may leave it thus as long as the back of the image does not begin to spot.

When it is rendered very vigorous, remove it quickly to another clean slab, and well wash it in several waters, occasionally turning it, and gently passing the finger over the back; by this means you remove any crystals of gallic acid which might spot the picture.

The appearance of the image at the end of this process will enable you to judge if it was exposed in the camera the proper time.

If it becomes a blueish gray all over, the paper has been exposed too long; if the strongest lights in the object, which should be very black in the negative, are not deeper than the half tints, it has still been too long exposed; if, on the contrary, it

has been exposed too short a time, the lights are but slightly marked in black.

If the time has been just right, you will obtain a superb proof, which will exhibit well defined contrasts of black and white, and the light parts very transparent. The operation is sometimes accelerated by heating the gallic acid, and by this process the dark parts of the picture are rendered very black.

To fix these negative proofs, a very strong solution of hyposulphite of soda is employed, and the picture is allowed to remain in it until every trace of yellowness is removed from the paper.

M. Le Gray has also employed collodion—gun cotton dissolved in ether—mixed with spirits of wine, and spread over paper, instead of the isinglass, with very good effect.

Mr. Cousins mentions, in his translation of M. Le Gray's paper, that the following were the improved proportions in which he recommended an albuminous mixture to be made for the paper:—

White of Eggs,	2 fluid ounces and a half.
Iodide of Potassium	56 grains.
Bromide of Potassium	15½ “
Chloride of Sodium	4 “

M. Le Gray, in his memoir, gives the following general directions:—

Pour the solution into a dish, placed horizontally, taking care that there is no froth; then take the paper that you have chosen, and wet it on one side only, beginning at the edge of the dish which is nearest to you, and the largest side of the sheet, placing the right angle on the liquid, and inclining it towards you; advance it in such a manner as to exercise a pressure which will remove the air-bubbles. Place before you a light, so as to be able to perceive the bubbles, and to push them out if they remain.

Let the leaf imbibe for a minute at most, without touching it; then take it up gently, but at once, with a very regular movement, and hang it up by the corner to dry.

You prepare thus as many leaves as you wish in the same bath, taking care that there is always about a quarter of an inch in depth of the solution in the dish; then place your sheets (thus prepared and dried) one on the other between two leaves of white paper, and pass over them several times a very hot iron, taking out a leaf

each time: you will thus render the albumen insoluble.

The iron should be as hot as it can be without scorching the paper.

Then make use of this negative paper exactly like the first paper named, only great attention must be observed that the immersion in the aceto-nitrate bath is instantaneous, and that the air-bubbles are immediately driven out; for every time you stop, you will make stains the same as on glass. It is also necessary to heat moderately the gallic acid.

One of the best services rendered by albumen to photography is, without doubt, its application to the preparation of the positive paper, to which it gives a brilliancy and vigor difficult to obtain by any other method; which is prepared thus:—

Take white of eggs, to which add the fifth part by volume of saturated solution of chloride of sodium; then beat it into froth, and decant the clear liquid after it has settled for one night.

With this the paper is first washed, and then with a strong solution of nitrate of silver.

M. Blanquart Evrard published a process as his own, in France, and received the compliments of the Academy of Sciences for it, which in no respect differed from Mr. Talbot's: this, therefore, requires no further notice; but a modification of M. Victor's, and his own application of albumen, must not be neglected.

Method of preparing paper with albumen, so that it may be employed whilst dry.—The paper prepared by means of albumen possesses properties analogous to those prepared by means of serum, but in a much less degree: the former, like the latter, may be kept for an indefinite time after its preparation with the iodide of potassium, but after having been submitted to the action of the aceto-nitrate of silver it will not keep good beyond the next day. The impressions obtained by means of the following preparation are admirable: though not so well defined as those on glass, yet they are more beautiful, as the outline is less harsh, and they possess more harmony and softness. We consider this to be quite a triumph for those who exercise themselves in the photographic art.

Beat into a froth the whites of eggs, to which a saturated solution of the iodide of

Potassium, and bromide of potassium, has been added, in the proportion of thirty drops of the former and two drops of the latter for the white of each egg; let the mixture stand until the froth returns to a liquid state, filter through clear muslin, and collect the albumen in a large flat vessel. On this lay the paper to be prepared, and allow it to remain there some minutes. When it has imbibed the albumen, lift it up by one of its corners; let it drain and lastly dry, by suspending it with pins to a line or cord across the room. The subsequent preparation with the aceto-nitrate of silver is in every respect similar to that above described for the paper prepared with serum; care being taken not to dry it between the two folds of blotting paper until it has become perfectly transparent.

The exposure of the prepared paper to the light in the camera is done in the same way, and the same treatment with gallic acid is followed: it will, however, be found that the time required for exposure will generally be four or five minutes.

Preparation of albuminous paper for receiving a positive image.—The positive paper prepared with albumen gives impressions somewhat shining, but of a very rich tone, well defined, and of perfect transparency: it is prepared in the following manner:—To any quantity of white of eggs add 25 per cent. by weight of water, saturated with chloride of sodium; beat into a froth, and filter as in the previous operation,—only in this case leave the paper in contact with the albumen for only half a minute; hang it up to dry, which it usually does in six to eight minutes; then lay it on a vessel containing a solution of 25 parts of nitrate of silver in 100 parts of water. Leave the paper on the solution for at least six minutes, then place it on a plate to dry.

The serum of milk has also been employed on paper as a quickening agent, and some of the French authorities speak highly of it; but I am not enabled from my own experience to speak of its advantages.

CHAPTER IX.

PHOTOGRAPHIC PROCESSES ON GLASS PLATES.

The first published account of the use of glass plates for photographic purposes is

to be found in Sir John Herschel's Memoir "*On the chemical action of the rays of the solar spectrum on preparations of silver and other substances.*" (Philosophical Transactions, Part 1 for 1840.) The interest which attaches to this is so great, and there appears to be in the process recommended by the English experimentalist so many suggestive points, from which future photographers may start, that the passage is given in Sir John Herschel's own words.

"With a view to ascertain how far organic matter is indispensable to the rapid discoloration of argentine compounds, a process was tried which it may not be amiss to relate, as it issued in a new and very pretty variety of the photographic art. A solution of salt of extreme dilution was mixed with nitrate of silver, so dilute as to form a liquid only slightly milky. This was poured into a somewhat deep vessel, at the bottom of which lay horizontally a very clean glass plate. After many days the greater part of the liquid was decanted off with a siphon tube, and the last portions very slowly and cautiously drained away, drop by drop, by a siphon composed of a few fibres of hemp, laid parallel and moistened without twisting. The glass was not moved till quite dry, and was found coated with a pretty uniform film of chloride of silver, of delicate tenuity and chemical purity, which adhered with considerable force, and was very little sensitive to light. On dropping on it a solution of nitrate of silver, however, and spreading it over by inclining the plate to and fro (which it bore without discharging the film of chloride) it became highly sensitive, although no organic matter could have been introduced with the nitrate, which was quite pure, nor could any indeed have been present unless it be supposed to have emanated from the hempen filaments, which were barely in contact with the edge of the glass, and which were constantly *abstracting* matter from its surface in place of introducing new.

"Exposed in this state to the focus of a camera with the glass towards the incident light, it became impressed with a remarkably well defined negative picture, which was direct, or reversed, according as looked at from the front or the back. On pouring over this cautiously, by means of a pipette,

a solution of hyposulphite of soda, the picture disappeared, but this was only while wet; for on washing in pure water and drying, it was restored, and assumed much the air of a daguerreotype when laid on a black ground, and still more so when smoked at the back, the silver portions reflecting most light, so that its characters had in fact, changed from negative to positive. From such a picture (of course before smoking) I have found it practicable to take photographic copies; and although I did not, in fact, succeed in attempting to thicken the film of silver, by connecting it, under a weak solution of that metal, with the reducing pole of a voltaic pile, the attempt afforded distinct indications of its practicability with patience and perseverance, as here and there, over some small portions of the surface, the lights had assumed a full metallic brilliancy under this process. I would only mention further, to those who may think this experiment worth repeating, that all my attempts to secure a good result by drying the nitrate in the film of chloride have failed, the crystallization of the salt disturbing the uniformity of the coating. To obtain delicate pictures the plate must be exposed wet, and when withdrawn must immediately be plunged into water. The nitrate being thus abstracted the plate may then be dried, in which state it is half fixed, and it is then ready for the hyposulphite. Such details of manipulation may appear minute, but they cannot be dispensed with in practice, and cost a great deal of time and trouble to discover.

"This mode of coating glass with films of precipitated argentine or other compounds, affords, it may be observed, the *only* effectual means for studying their habits on exposure to light, free from the powerful and ever-varying influence of the *size* in paper, and other materials used in its manufacture, and estimating their degree of sensibility and other particulars of their deportment under the influence of reagents. I find, for example, that glass so coated with the iodide of silver is much more sensitive than if similarly covered with the chloride, and that if both be washed with one and the same solution of nitrate, there is no comparison in respect of this valuable quality; the iodide being far superior, and of course to be adopted in preference, for the use of the

camera. It is, however, more difficult to fix, the action of the hyposulphites on this compound of silver being comparatively slow and feeble.

"When the glass is coated with bromide of silver, the action, *per se*, is very slow, and the discoloration ultimately produced far short of blackness; but when moistened with nitrate of silver, sp. gr. 1.1, it is still more rapid than with the iodide, turning quite black in the course of a very few seconds exposure to sunshine. Plates of glass thus coated may be easily preserved for the use of the camera and have the advantage of being ready at a moment's notice, requiring nothing but a wash over with the nitrate of silver, which may be delayed until the image is actually thrown on the plate, and adjusted to the correct focus with all deliberation. The sensitive wash being then applied with a soft flat camel-hair brush, the box may be closed and the picture impressed, after which it only requires to be thrown into water, and dried in the dark, to be rendered comparatively insensible, and may be finally fixed with hyposulphite of soda, which must be applied hot, its solvent power on the bromide being even less than on the iodide."

Sir John Herschel suggested a trial of the fluoride of silver upon glass, which, he says, if proved to be decomposable by light, might possibly effect an etching on the glass, by the corroding property of the hydrofluoric acid.

The metallic fluorides have been found to be decomposable, and a very sensitive process on paper, called the fluorotype, will be described in the chapter on miscellaneous processes. I am not aware that any experiments have been made directly upon glass, but it is certainly worthy of a careful trial.

Herschel has remarked that we cannot allow the wash of nitrate to dry upon the coating of the chloride or iodide of silver. If, however, we dip a glass which has one film of chloride upon it into a solution of common salt, and then spread upon it some nitrate of silver, we may very materially thicken the coating, and thus produce more intense effects. Mr. Towson employed glass plates prepared in this manner with much success. The mode adopted by that gentleman was to have a box the exact size of the glass plate, in the bottom of

which was a small hole ; the glass was placed over the bottom, and the mixed solution, just strong enough to be milky, of the salt and silver spread in. As the fluid finds its way slowly around the edges of the glass, it filters out ; the peculiar surface action of the solid glass plate, probably a modified form of cohesive force, separating the fine precipitate, which is left behind on the surface of the plate. By this means the operation of coating the glass is much quickened. Another method by which films of any of the salts of silver can be produced upon glass plates is the following modification of the patent processes of Drayton and of Thompson for silvering glass.

Take a very clear plate of glass, and having put around it an edging of wax about half an inch in depth, pour into it a solution of nitrate of silver made alkaline by a few drops of ammonia, taking care that no oxide of silver is precipitated ; mix with this a small quantity of spirits of wine, and then add a mixture of the oils of lavender and cassia, or, which is perhaps the best process, a solution of grape sugar. In a short time the glass will be covered with a very beautiful metallic coating. The solution is now poured off, and the edge removed ; the silver is exposed to the action of diluted chlorine, to the vapor of iodine or bromine, until it is converted into compound with one of these elements, after which we may proceed as in the former case.

In the *Technologiste* for 1848, M. Niepce de Saint Victor published his mode of applying albumen to glass plates. M. Blanquart-Evrard followed ; and successive albumen, gelatine, serum, collodion, and other substances, have been recommended for application on glass ; but few of these substances have been found to answer so perfectly as albumen applied according to the directions of M. Le Gray.

He recommends that the whites of fresh eggs equal to about five fluid ounces be mixed with more than 100 grains of the iodide of potassium, and about twenty grains of the bromide, and half that quantity of common salt.

He then directs you to beat this mixture in a large dish with a wooden fork, until it is reduced to a thick white froth, to let it repose all night ; the next day decant the

viscous liquid, which has deposited, and use it for the preparation of your glasses.

For this purpose take thin glass, or, what is much better, *ground glass*, on which the adherence is more perfect ; cut it the size of your camera frame, and grind the edges.

The success of the proof is, in a great measure, due to the evenness of the coat of albumen.

To obtain this, place one of the glasses horizontally, the unpolished side above (if you use ground glass, which I think preferable), and then pour on it an abundant quantity of the albumen. Take a rule of glass very straight, upon the ends of which have been fastened two bands of stout paper steeped in white wax ; hold this with the fingers in such a manner that they will overlap the sides of the glass plate about one-eighth of an inch. You then draw the rule over the glass with one sweep, so as to take off the excess of albumen. The object of the slip of paper is to keep the glass rule from the surface of the plate, and ensure a thin but even coating of the albuminous mixture.

Thus, in making the paper band more or less thick, you vary the thickness of the coating. Or you may arrive at the same result by pasting two narrow bands of paper on the sides of the plate, and simply passing the rule down. I prefer the first means, because with the second one is almost sure to soil the glass in sticking on the paper.

You must never go the second time over the glass with the rule, or you will make air-bubbles ; when thus prepared, permit it to dry spontaneously, keeping it in an horizontal position and free from dust. When the coat of albumen is well dry, submit your glasses to the temperature of 160° to 180° Fahrenheit ; this you may do either before a quick fire, or by shutting them up in an iron saucepan well tinned, with a cover ; you then place the saucepan in a bath of boiling water : the action of the heat hardens the albumen ; it then becomes perfectly insoluble, and ready to receive the aceto-nitrate of silver.

The glasses thus prepared may be kept for any length of time. I prepare the first coat also by saturating the former mixture with gallic acid, which gives it more consistency and greater sensitiveness.

When you wish to make a proof, (by using the preparation moist,) you plunge the glass thus prepared in a bath of aceto-nitrate of silver, described in the second operation of the negative paper. This operation is very delicate, because the least stoppage in its immersion in the bath will operate on the sensitive coating, and cause irregularities which nothing can remedy.

To obtain this instantaneous and regular immersion, I make a box with glass sides, a trifle larger than the plate, and about half-an-inch wide, with wooden grooves, similar to those in the daguerreotype plate box; into this I pour the aceto-nitrate, and let the prepared glass fall into it with a single movement, leaving it to soak four or five minutes in the bath; then remove it, wash well with distilled water, and expose it in the camera while moist. The time will vary from two to thirty minutes, or nearly double that time if the glass is dry.

When you wish to operate with the glasses dry instead of moist, it is proper to dip them in a bath of gallic acid a quarter of an hour after they are taken out of the aceto-nitrate bath; then well wash them with distilled water, and dry them as directed.

When you take the plate out of the camera, you develop the image the same as the negative on paper, by putting it into a bath of saturated gallic acid; when it is well developed, fix it by the same method indicated for the paper.

To obtain a positive proof, it is sufficient to apply on the negative proof a sheet of common positive paper, or, better still, a sheet of positive albumen paper, which I will describe hereafter.

You then put it in the pressure frame, placing above it a piece of black cloth pasted on one side of a thick sheet of glass; then shut the frame, giving to the proof a slight pressure; after which, expose it to the light. In order to follow its action, you may just raise it by one corner of the glass, to judge of the tint which the image takes: when you think it sufficiently exposed, take it out of the frame, and fix it the same as the positive paper.

Some very ingenious experiments have been made by Mr. Malone, from whose

communications the following remarks are quoted:—

“To the white of an egg its own bulk of water is to be added; the mixture, beaten with a fork, is then strained through a piece of linen cloth, and preserved for use in a glass stoppered bottle; then a piece of plate glass, cleaned with a solution of caustic potash, or any other alkali, is to be washed with water and dried with a cloth. When the glass is about to be used, breathe on it, and rub its surface with clean new blotting paper; then, to remove the dust and fibres which remain, use cotton-wool or a piece of new linen. Unless this latter, and, indeed, every other precaution is taken to prevent the presence of dust, the picture will be full of spots, produced by a greater absorption of iodine (in a subsequent process) in those than in the surrounding parts.

“On the clear glass pour the albumen, inclining the plate from side to side until it is covered; allow the excess to run off at one end of the corners, keeping the plate inclined, but nearly vertical. As soon as the albumen ceases to drop rapidly, breathe on or warm the lower half of the plate; the warmth and moisture of the breath will soon cause it to part with more of its albumen, which has now become more fluid: of course, care must be taken to warm only the lower half. Wiping the edges constantly hastens the operation. Until this plan was adopted, the coatings were seldom uniform; the upper half of the plate retained less than the lower. When no more albumen runs down, dry the plate by a lamp, or by a common fire, if the dust that it is inclined to impart be avoided.

“The next operation is to iodize the plate. Dilute pure iodine with dry white sand in a mortar, using about equal parts of each; put this mixture into a square vessel, and place over it the albumenized plate, previously heated to about 100° Fah. As soon as the film has become yellow in color, resembling beautifully stained glass, remove the plate into a room lighted by a candle, or through any yellow transparent substance, yellow calico for instance, and plunge it vertically and rapidly into a deep narrow vessel containing a solution of one hundred grains of nitrate of silver to fifty minims of glacial acetic acid, diluted with

five ounces of distilled water. Allow it to remain until the transparent yellow tint disappears, to be succeeded by a milky-looking film of iodide of silver. Washing with distilled water leaves the plate ready for the camera.

"It may be here noted that the plate is heated in iodizing for the purpose of accelerating the absorption of the iodine: an exposure to the vapor for ten minutes, with a few seconds' immersion in the silver solution, has been found to be sufficient."

Hydrochloric acid, chlorine or bromine, may be used with the iodine to give increased sensibility to the plate.

The plate is removed from the camera, and we pour over it a saturated solution of gallic acid. "A negative Talbotype image is the result. At this point previous experimentalists have stopped. We have gone further, and find that by pouring upon the surface of the reddish brown negative image, during its development, a strong solution of nitrate of silver, a remarkable effect is produced. The brown image deepens in intensity until it becomes black. Another change commences—the image begins to grow lighter; and finally, by perfectly natural magic, black is converted into white, presenting the curious phenomena of the change of a Talbotype *negative* into apparently a positive daguerreotype, the positive still retaining its negative properties when viewed by transmitted light.

To fix the picture, a solution of one part of hyposulphite of soda in sixteen parts of water is poured upon the plate, and left for several minutes, until the iodide of silver has been dissolved. Washing in water completes the process.

"The phenomena of the daguerreotype," says Mr. Malone, "is in this case produced by very opposite agency, no mercury being present, metallic silver here producing the lights, while in the daguerreotype it produces the shadows of the picture. We at first hesitated about assigning a cause for the dull white granular deposit which forms the image, judging it to be due simply to molecular arrangement. Later experiments, however, have given us continuous films of bright metallic silver, and we find the dull deposit becomes brilliant and metallic when burnished. It should be observed that the positive image

we speak of is on glass, strictly analogous to the Daguerreotype. It is positive when viewed at any angle but that which enables it to reflect the light of the ray. This is one of its characteristics. It must not be confounded with the continuous film image which is seen properly only at one angle; the angle at which the other ceases to exist. It is also curious to observe the details of the image, absent when the plate is viewed negatively by transmitted light, appear when viewed positively by reflected light."

Niepce de Saint Victor has recently published a process in which he employs starch instead of albumen on the glass plates. The main features of this process are as follows:—About 70 grains of starch are rubbed down with the same quantity of distilled water, and then mixed with three or four ounces more water; to this is added $5\frac{1}{2}$ grains of iodide of potassium dissolved in a very small quantity of water, and the whole is boiled until the starch is properly dissolved. With this the glass plates are carefully covered, and then placed to dry on a perfectly horizontal table. When thoroughly dried the aceto-nitrate of silver is applied, by wetting a piece of paper, placing this on the starch, and over it another piece of paper wetted with distilled water. This mode of preparation furnishes, it is said, tablets of great sensibility; but the starch is liable to break off from the glass, and there is much difficulty in spreading it uniformly in the first instance.

Mr. Mayall has recently published a form of process, employed by M. Martin, which differs in no essential particular from those already described; but as involving some niceties of manipulation, on which, the writer says, depends the perfection of his finished pictures, it is thought advisable to quote it.

"First. The albumen of a *fresh* egg must be beaten into a snow like mass with a bunch of quills, dropping into it ten drops of a saturated solution of iodide of potassium; allow it to stand six hours in a place free from dust, and moderately warm, say, 60°.

"Second. A piece of hand-plate glass, eight inches by six, with the edges ground smooth, must be cleaned as follows: with a piece of cotton wool rub over both sides with concentrated nitric acid, then rinse

well with water and dry. Stick a wafer on that side which I will now call the back, to mark it; pounce upon the face a moderate quantity of fine tripoli, moistened with a few drops of a concentrated solution of carbonate of potash, then with a piece of cotton wool rub the surface briskly in circles for about five minutes; then with dry tripoli; then with clean cotton to clear away all the dusty particles.

"Third. To the centre of the back stick a gutta percha ball, as a handle: strain the prepared albumen through clean linen; pour it gently into the centre of the cleaned side of the glass, keep it moving until the surface is entirely covered, run it into the corners, and finally pour off any excess at the four corners; disengage the gutta percha handle, and place the glass on another slab, that has been levelled by a spirit level, in a place perfectly free from dust, and moderately warm. I will call this my *iodo-albumenized glass*; it will keep for any length of time, and may be prepared in daylight.

"Fourth. To excite (a yellow shaded light only being used), dissolve 50 grains of nitrate of silver in 1 ounce of distilled water and 120 grains of strong acetic acid; pour the whole of this solution into a *cuvette*, or shallow porcelain dish, a little larger than the glass plate; place one end of the iodo-albumenized glass in the solution; with a piece of quill support the upper end of the glass, and let it fall suddenly on to the solution, lifting it up and down for ten seconds; take it out and place it face upwards in another dish, half filled with distilled water; allow the water to pass over the surface twice; take out the glass, rear it up to dry; it is ready for the camera, and will keep in this state ten days,—of course, shut up from daylight, in a moderately warm place, but never moist. The solution may be filtered into a black bottle, and will do again by now and then adding a few drops of acetic acid, and keeping it in the dark. Expose in the camera from four to ten minutes, according to the amount of light and the aperture of the lens. Suppose I say a lens of three inches diameter, sixteen in focus for parallel rays, a one inch diaphragm placed three inches in front of the lens (one of Ross's photographic lenses is just the

thing), the exposure would be in good light about five minutes.

"Fifth. Develop as follows. Place the glass, face upwards, on a stand with adjusting screws to make it level; pour a concentrated solution of gallic acid over the surface; the image will be from half an hour to two hours in coming out. It is best to apply a gentle heat, not more than 10° above the temperature of the room, it being 60° . Should the image still be feeble, pour off the gallic acid, rinse the proof with water, and pour on to it equal quantities of aceto-nitrate of silver and gallic acid reduced one half with water. The image will now quickly develop; arrest it in four or five minutes, wash it well in three waters, and fix with hyposulphite of soda as follows:—

"Sixth. Three drachms of hyposulphite of soda to one ounce of water. Allow the proof to remain in this solution until all the yellow iodide disappears, wash it well, rear it up to dry; and it is finished.

"Success is sure to attend any one practising this method, provided the *eggs are fresh* and the *glass is clean*: if the glass is not clean, or the eggs are stale, the albumen will split off in fixing.

"*Caution.*—Wash all the vessels as soon as done with, with nitric acid, and then with water. Every precaution should be used to avoid dust. The albumen of a duck's egg is more sensitive than that of a hen; and from an experiment of to-day, I am almost certain that of a goose is more sensitive than either."—*Athenæum*, No. 1220.

Several other preparations have been employed with variable success, and recommended for procuring an absorbent film upon glass plates—amongst others the serum of milk has been used by M. Blanquart Evrard; others combine with their albumen or gelatine, grape sugar and honey; the object of these being to quicken the process, which they appear to do in virtue of their power of precipitating the metals from their solutions.

Blanquart Evrard has lately communicated the following to the Paris Academy of Sciences, as an instantaneous process:—“Fluoride of potassium added to iodide of potassium, in the preparation of the negative proof produces instantaneous images

on exposure in the camera. To assure myself of the extreme sensibility of the fluoride, I have made some experiments on the slowest preparations employed in photography—that of plates of glass covered with albumen and iodine, requiring exposure of at least sixty times longer than the same preparation on paper. On adding the fluoride to the albumen and iodide, and substituting for the washing of the glass in distilled water after treatment with the aceto-nitrate of silver, washing in fluoride of potassium the image immediately on exposure in the camera-obscura, I have indeed obtained this result (but under conditions less powerful in their action) without the addition of the fluoride to the albumen, and by the immersion only of the glass plate in a bath of fluoride after its passage through the aceto nitrate of silver. This property of the fluorides is calculated to give very valuable results, and will probably, in this branch of photographic art, effect a change equally as radical as that effected by the use of bromine on the iodized silver plates of Daguerre.” A process published in the author’s *Researches on Light*, in 1844, and named the Fluorotype, sufficiently establishes my claim to priority in the use of the fluorides. In a subsequent chapter the peculiarities of these salts will be the subject of consideration. The moment intimation was given of the employment of glass plates for the negative photographic pictures, an attempt was made in this country to include them in a patent; but the previous publication of Sir John Herschel’s experiments on glass prevented this. Mr. Talbot has, however, patented the use of unglazed porcelain. It is impossible to say what may be the result of the experiments of this gentleman, but there appear to be many objections to the use of this material; and it is also very doubtful if such plates can be manufactured sufficiently true for the delicate purposes of photography.

From the specification we glean the following particulars of the process practised by Mr. Talbot upon the biscuit-ware tablets.

PICTURES ON PORCELAIN TABLETS, AND MR. FOX TALBOT’S LAST PATENT.—The first part of the patentee’s invention consists in the use of plates of unglazed porcelain, to receive the photographic image.

A plate intended for photographic purposes should be made of the finest materials employed by the manufacturers of porcelain; it should also be flat, very thin, and semi-transparent; if too thin, so that there would be a chance of breaking, it may be attached by means of cement to a piece of glass, to give it strength. The substance of the plate should be slightly porous, so as to enable it to imbibe and retain a sufficient quantity of the chemical solutions employed. To prepare the plate for use, it is first required to give it a coating of albumen, or white of eggs, laid on very evenly, and then gently dried at a fire. According as the plate is more or less porous, it requires more or less of the albuminous coating; it is best to employ a very close grained porcelain, which requires but very little white of egg. The prepared plate may be made sensitive to light in the same way in which a sheet of paper is rendered sensitive; and we generally find the same methods applicable for photographic pictures on paper applicable to those on porcelain plates, and one of the processes employed by the patentees is nearly the same as that patented by Mr. Talbot in 1841. The prepared plate is dipped into a solution of nitrate of silver, made by dissolving twenty-five grains of nitrate in one ounce of water; or the solution is spread over the plate uniformly with a brush; the plate is then dried, afterwards dipped into a solution of iodide of potassium, of the strength of about twenty-five grains of iodide to one ounce of water, again dried, and the surface rubbed clean and smooth with cotton. The plate is now of a pale-yellow color, owing to the formation on its surface of iodide of silver. The plate prepared as above directed may be kept in this state until required, when it is to be rendered sensitive to light by washing it over with a solution of gallo-nitrate of silver, then placed in the camera; and the image obtained is to be rendered visible, and sufficiently strengthened, by another washing of the same liquid, aided by gentle warmth. The negative picture thus obtained is fixed by washing it with water, then with bromide of potassium, or, what is still better, hyposulphite of soda, and again several times in water. The plate of porcelain being semi-transparent, positive pictures can be obtained from the

above-mentioned negative ones by copying them in a copying frame.

The picture obtained on porcelain can be altered or modified in appearance by the application of a strong heat—a process not applicable to pictures taken on paper. With respect to this part of their invention the patentees claim :—"The obtaining, by means of a camera, or copying-frame, photographic images or pictures upon slabs or plates of porcelain." The second part relates to the process which has been discovered and improved upon by Mr. Malone, who is associated with Mr. Fox Talbot in the patent. "The patentee's improvement is a method of obtaining more complete fixation of photographic pictures on paper. For this purpose, the print, after undergoing the usual fixing process is dipped into a boiling solution of strong caustic potash, which changes the color of the print, and usually, after a certain time, acquires something of a greenish tint, which indicates that the process is terminated.

The picture is then well washed and dried, and if the tint acquired by it is not pleasing to the eye, a slight exposure to the vapors of sulphuretted hydrogen will restore to it an agreeable brown or sepia-tint. Under this treatment the picture diminishes in size, insomuch that if it were previously cut in two, and one part submitted to the potash process and the other not, the two halves, when afterwards put together, would be found not to correspond. The advantages of this process for removing any iodine which, even after fixing with the hyposulphite, remains in the paper, is great, and it will tend much to preserve these beautiful transcripts of nature.

The patentee then claims as an improvement the use of varnished paper, or other transparent paper impervious to water, as a substitute for glass, in certain circumstances, to support a film of albumen, for photographic purposes. A sheet of writing paper is brushed over with several coats of varnish on each side: it thus becomes extremely transparent. It is then brushed over on one side with albumen, or a mixture of albumen and gelatine, and then dried. This film of albumen is capable of being rendered sensitive to light by exposing it to the vapor of iodine, and by following the rest of the process indicated in the preceding section of this specification.

The advantages of using varnished or oil paper do not consist in any superiority of the images over those obtained upon glass, but in the greater convenience of using paper than glass in cases where a large number of pictures have to be made and carried about for considerable distances: besides this, there is a well-known kind of photographic pictures giving panoramic views of scenery, which are produced upon a curved surface by a movement of the object-glass of the camera. To the production of these images glass is hardly applicable, since it cannot be readily bent to the required curve and again straightened; but the case is met by employing talc, varnished paper, oiled paper, &c., instead of glass. It will be seen that the varnished paper acts as a support to the film of albumen or gelatine, which is the surface on which the light acts, and forms the picture. The next improvement consists in forming photographic pictures or images on the surfaces of polished steel plates. For this purpose one part (by measure) of a saturated solution of iodide of potassium is mixed with 200 parts of albumen, and spread as evenly as possible upon the surface of a steel plate, and dried by the heat of a gentle fire. The plate is then taken, and, whilst still warm, is washed over with an alcoholic solution of gallo-nitrate of silver, of moderate strength. It then becomes very sensitive, and easily receives a photographic image. If the plate be cold, the sensibility is considerably lower. The image obtained is fixed by washing with hyposulphite of soda, and finally with water. The print adheres to the steel with much tenacity, and forms a process very useful to engravers. With respect to this part of the invention, the patentee claims the production of a photographic image upon a plate of steel. Upon a careful examination of this patent, it will be evident that the substitution of porcelain for glass, with very doubtful advantage, constitutes its only real novelty, excepting the process above described by Mr. Malone. The images on oiled paper are said to be exceedingly good, and this may be a valuable suggestion.

Messrs. Ross and Thompson, of Edinburgh, at the meeting of the British Association in that city, exhibited some positive images on glass plates, these were backed

up with plaster of Paris, for the purpose of exalting the effects, which were exceedingly delicate and beautiful.

Messrs. Langenheim, of Philadelphia, have, however, just introduced into this country specimens, which they term Hyalotypes. These are positive pictures, copied on glass from negatives obtained upon the same material. Their peculiarity is the adaptation of them for magic-lantern slides. The process by which they are produced is not published, but judging from the effects obtained, the probability is, that a very slight variation only, from the processes described, has been made. The idea is an exceedingly happy one, as by magnifying those images which are of the utmost delicacy, and the strictest fidelity, perfect reflexes of nature are obtained: it, however, originated in England about two years since.

There can be no doubt but other means of coating glass with sensitive materials may be employed. Certainly the use of albumen is a ready method, but this medium appears to interfere with the sensibility which it is so desirable to obtain. As stated, by using combinations of iodide and fluoride salts, there is no doubt but the sensibility may be most materially improved, and we find many of the continental photographers using honey and grape sugar with much advantage.

I would, however, venture to suggest that films of silver precipitated from the solution of the nitrate by grape sugar, aldehyde, or gun cotton dissolved in caustic alkali, upon which any change could be afterwards produced, appear to promise many important advantages.

The use of glass tablets cannot be dismissed without a notice of the process of Niepce, for although he employed metal in most cases, glass offers some advantages for the reproduction of the resinous pictures, and enables us to produce some very pleasing effects: therefore it is thought advisable to deal with the *heliographic* process in this place.

HELIOGRAPHY.—M. Niepce was the first inquirer who appears to have produced *permanent* pictures by the influence of the sun's rays. This process—Heliography—is many respects peculiar, which renders it necessary, although his preparation was only acted on by an exposure of many

hours to full sunshine, to give a particular account of it; the more so, as some points of considerable interest require further elucidation.

The substance employed by M. Niepce was *asphaltum*, or bitumen of Judea. He thus directs its preparation;—"I about half fill a wine-glass with this pulverised bitumen; I pour upon it, drop by drop, the essential oil of lavender,* until the bitumen is completely saturated. I afterwards add as much more of the essential oil as causes the whole to stand about three lines above the mixture, which is then covered and submitted to a gentle heat until the essential oil is fully impregnated with the coloring matter of the bitumen. If this varnish is not of the required consistency, it is to be allowed to evaporate slowly, without heat, in a shallow dish, care being taken to protect it from moisture, by which it is injured, and at last decomposed. In winter, or during rainy weather, the precaution is doubly necessary. A tablet of plated silver, or well cleaned and warm glass, is to be highly polished, on which a thin coating of the varnish is to be applied cold, with a light roll of very soft skin: this will impart to it a fine vermilion color, and cover it with a very thin and equal coating. The plate is then placed upon heated iron, which is wrapped round with several folds of paper, from which by this method all moisture had been previously expelled. When the varnish has ceased to simmer, the plate is withdrawn from the heat, and left to cool and dry in a gentle temperature, and protected from a damp atmosphere. In this part of the operation a light disc of metal, with a handle in the centre, should be held before the mouth, in order to condense the moisture of the breath."

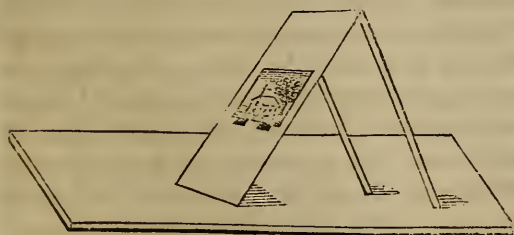
The plate thus prepared is now in a fit state for use, and may be immediately fixed in the correct focus of the camera. After it has been exposed a sufficient length of time for receiving the impression, a very faint outline alone is visible. The next operation is to bring out the hidden picture, which is accomplished by a solvent.

This solvent must be carefully adapted

* The English oil of lavender is too expensive for this purpose. An article sold as the French oil of lavender, redrawn, is very much cheaper, and answers in every respect as well, if not better.

to the purposes for which it is designed; it is difficult to fix with certainty the proportions of its components, but in all cases it is better that it be too weak than too strong,—in the former case the image does not come out strongly,—in the latter it is completely destroyed. The solution is prepared of one part—not by weight, but volume—of the essential oil of lavender, poured upon ten parts—by measure also—of oil of white petroleum. The mixture, which is first milky, becomes clear in two or three days. This compound will act until it becomes saturated with the asphaltum, which state is readily distinguished by an opaque appearance, and dark brown color. A tin vessel somewhat larger than the photographic tablet, and one inch deep, must be provided. This is to have as much of the solvent in it as will cover the plate. The tablet is plunged into the solution, and the operator, observing it by reflected light, begins to see the images of the objects, to which it has been exposed, slowly unfolding their forms, though still veiled by the gradually darkening supernatant fluid. The plate is then lifted out, and held in a vertical position, till as much as possible of the solvent has been allowed to drop away. When the dropping has ceased, we proceed to the last, and not the least important operation, of washing the plate.

This is performed by carefully placing the tablet upon a long board, fixed at a large angle, the supports being joined to it by hinges, to admit of the necessary changes of inclination, under different circumstances; two small blocks, not thicker than the tablet, are fixed on the board, on which the plate rests. Water must now



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be slowly poured upon the upper part of the board, and allowed to flow evenly over the surface of the picture. The descending stream clears away all the solvent that may yet adhere to the varnish. The plate

is now to be dried with great care by a gentle evaporation: to preserve the picture it is requisite to cover it up from the action of light, and protect it from humidity.

The varnish may be applied indifferently to metals, stone, or glass; but M. Niepce prefers copper plated with silver. To take copies of engravings, a small quantity of wax is dissolved in essential oil of lavender, and added to the varnish already described; the engraving, first varnished over the back, is placed on the surface of the prepared tablet, face towards it, and then exposed to the action of the light. In the camera-obscura an exposure of from six to eight hours, varying with the intensity of light, is required; while from four to six hours is necessary to produce a copy of an engraving. The picture, in the first instance, is represented by the contrast between the polished silver and the varnish coating. The discoverer afterwards adopted a plan of darkening the silver by iodine, which appears to have led the way to Daguerre's beautiful process. To darken the tablet, it was placed in a box in which iodine was strewed, and watched until the best effect was produced. The varnish was afterwards removed by spirit of wine.

Of the use of glass plates, M. Niepce thus speaks:—"Two experiments in landscape upon glass, by means of the camera, gave me results which, although imperfect, appear deserving of notice, because this variety of application may be brought more easily to perfection, and in the end become a more interesting department of heliography.

"In one of these trials the light acted in such a way that the varnish was removed in proportion to the intensity with which the light had acted, and the picture exhibited a more marked gradation of tone, so that, viewed by transmitted light, the landscape produced, to a certain extent, the well-known effects of the diorama.

"In the second trial, on the contrary, the action of the luminous fluid having been more intense, the parts acted upon by the strongest lights, not having been attacked by the solvent, remained transparent; the difference of tone resulted from the relative thickness of the coatings of varnish.

"If this landscape is viewed by reflection in a mirror, on the varnished side, and at a certain angle, the effect is remarkably

striking ; while, seen by transmitted light, it is confused and shapeless : but, what is equally surprising, in this position the mimic tracery seems to affect the local color of the objects."

A statement that M. Niepce was enabled to engrave by light, went the round of the press ; but this does not appear to have been the case. All that the author of heliography effected, was the etching of the plate, after it had undergone its various processes, and the drawing was completed by the action of nitric acid in the usual manner ; the parts of the copperplate protected by the varnish, remained, of course, unacted on, whilst the other parts were rapidly attacked by the acid. The author remarks that his process cannot be used during the winter season, as the cold and moisture render the varnish brittle, and detaches it from the glass or metal.

M. Niepce afterwards used a more unctuous varnish, composed of *bitumen of Judea, dissolved in animal oil of Dippel*, an article which is rather difficult to obtain in England. This composition is of much greater tenacity and higher color than the former ; and, after being applied, it can immediately be submitted to the action of light, which appears to render it solid more quickly, from the greater volatility of the animal oil. M. Daguerre remarks, that this very property diminishes still further the resources of the process as respects the lights of the drawings thus obtained. These processes of M. Niepce were much improved by M. Daguerre, who makes the following remarks on the subject :—

The substance which should be used in preference to bitumen is the residuum obtained by evaporating the essential oil of lavender, which is to be dissolved in alcohol, and applied in an extremely thin wash. Although all bituminous and resinous substances are, without any exception, endowed with the same property—that of being affected by light—the preference ought to be given to those which are the most unctuous, because they give greater firmness to the drawings. Several essential oils lose this character when they are exposed to too strong a heat.

It is not, however, from the ease with which it is decomposed, that we are to prefer the essential oil of lavender. There are, for instance, the resins, which, being

dissolved in alcohol, and spread upon glass or metal, leave, by the evaporation of the spirit, a very white and infinitely sensitive coating. But this greater sensibility to light, caused by a quicker oxidation, renders also the images obtained much more liable to injury from the agent by which they were created. They grow faint, and disappear altogether, when exposed but for a few months to the sun. The residuum of the essential oil of lavender is more effectually fixed, but even this is not altogether uninfluenced by the eroding effects of a direct exposure to the sun's light.

The essence is evaporated in a shallow dish by heat, till the resinous residuum acquires such a consistency, that when cold it rings on being struck with the point of a knife, and flies off in pieces when separated from the dish. A small quantity of this material is afterwards to be dissolved in alcohol or ether ; the solution formed should be transparent, and of a lemon-yellow color. The clearer the solution, the more delicate will be the coating on the plate : it must not, however, be too thin, because it would not thicken or spread out into a white coat ; indispensable requisites for obtaining good effects in photographic designs. The use of the alcohol or ether is to facilitate the application of the resin under a very attenuated form, the spirit being entirely evaporated before the light effects its delineations on the tablet. In order to obtain greater vigor, the metal ought to have an exquisite polish. There is more charm about sketches taken on glass plates, and, above all, much greater delicacy.

Before commencing operations, the experimenter must carefully clean his glass or metal plate. For this purpose, emery, reduced to an impalpable powder, mixed with alcohol may be used ; applying it by means of cotton-wool : but this part of the process must always be concluded by dry-polishing, that no trace of moisture may remain on the tablet. The plate of metal or glass being thus prepared, in order to supply the wash or coating, it is held in one hand, and with the other the solution is to be poured over it from a flask or bottle having a wide mouth, so that it may flow rapidly and cover the whole surface. It is at first necessary to hold the plate a little inclined ; but as soon as the solution

is poured on, and has ceased to flow freely, it is raised perpendicularly. The finger is then passed behind and below the plate, in order to draw off a portion of the liquid, which, tending always to ascend, would double the thickness of the covering; the finger must be wiped each time, and be passed very rapidly along the whole length of the plate from below, and on the side opposite the coating. When the liquid has ceased to run, the plate is dried in the dark. The coating being well dried, it is to be placed in the camera-obscura. The time required to produce a photographic copy of a landscape is from seven to eight hours: but single monuments strongly illuminated by the sun, or very bright in themselves, are copied in about three hours.

When operating on glass, it is necessary in order to increase the light, to place the plate upon a piece of paper, with great care that the connection is perfect over every part, as, otherwise, confusion is produced in the design by imperfect reflection.

It frequently happens that when the plate is removed from the camera there is no trace of any image upon its surface: it is therefore necessary to use another process to bring out the hidden design.

To do this, provide a tin vessel, larger than the tablet, having all round a ledge or border 50 millimeters (2 English inches) in depth. Let this be three quarters full of the oil of petroleum; fix your tablet by the back to a piece of wood which completely covers the vessel, and place it so that the tablet, face downwards, is over but not touching the oil. The vapor of the petroleum penetrates the coating of the plate in those parts on which the light has acted feebly—that is, in the portions which correspond to the shadows, imparting to them a transparency, as if nothing were there. On the contrary, the points of the resinous coating, on which light has acted, having been rendered impervious to the vapor, remain unchanged.

The design must be examined from time to time, and withdrawn as soon as a vigorous effect is obtained. By urging the action too far, even the strongest lights will be attacked by the vapor, and disappear, to the destruction of the piece. The picture, when finished, is to be protected from

the dust, by being kept covered with a glass, which also protects the silver plate from tarnishing.

It may perhaps appear to some that I have needlessly given the particulars of a process, now entirely superseded by others, possessing the most infinite sensibility—producing in a few minutes a better effect than was given by the Heliographic process in several hours. There are, however, so many curious facts connected with the action of light on these resins, that no treatise on photography could be considered complete without some description of them.

M. Daguerre makes the remark, that numerous experiments tried by him prove that light cannot fall upon a body without leaving traces of decomposition; and they also demonstrate that these bodies possess the power of renewing in darkness, what has been lost by luminous action, provided total decomposition has not been effected.

The use of glass plates must not be entirely dismissed without a notice of a very pretty method of producing

POSITIVE PHOTOGRAPHS FROM ETCHINGS ON GLASS PLATES.

A very easy method of producing any number of positive photographs from an original design, is in the power of every one having some slight artistic talent. The merit of having suggested the process I am about to describe has been claimed by Messrs. Havell and Wellmore, and also by Mr. Talbot; indeed, there appears no reason to doubt the originality of either of these gentlemen, Mr. Havell having prosecuted his experiment in ignorance of the fact that Mr. Talbot had used the same means to diversify his photographic specimens. Mr. Talbot proposes that a plate of warmed glass be evenly covered with a common etching ground, and blackened by the smoke of a candle. The design is then to be made, by carefully removing from the glass all those parts which should represent the *lines* and *shadows*, and shading out the middle tints. It will be evident that the light passing through the uncovered parts of the glass, and being obstructed by the covered portions, will impress on the white photographic papers a correct picture, having the appearance of a spirited ink drawing.

Mr. Havell's method was to place a thin plate of glass on the subject to be copied, upon which the high lights were painted with a mixture of white lead and copal varnish, the proportion of varnish being increased for the darker shading of the picture. The next day Mr. Havell removed, with the point of a pen-knife, the white ground, to represent the dark etched lines of the original. A sheet of prepared paper having been placed behind the glass, and thus exposed to light, a tolerable impression was produced; the half tints had, however, absorbed too much of the violet rays, an imperfection which was remedied by painting the parts over with black on the other side of the glass; if allowed to remain too long exposed to the sun's rays, the middle tints became too dark, and

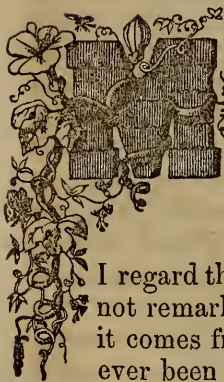
destroyed the effect of the sketch. Another method employed by Mr. Havell was to spread a ground composed of white lead, sugar of lead, and copal varnish, over a plate of glass, and having transferred a pencil drawing in the usual manner, to work it out with the etching point.

Various modifications of these processes have been introduced by different artists, and they evidently admit of many very beautiful applications. When the etching is executed by an engraver, the photograph has all the finish of a delicate copper-plate engraving. The only thing which detracts from this method of photography is, that the great merit of self-acting power is abandoned.

TO BE CONTINUED.

CORRESPONDENCE.

THE PRIZE PITCHER.



R. H. H. SNELLING.—I see by the Photographic Art-Journal that Mr. Anthony has offered a mammoth silver pitcher for the best full size daguerreotype that may come in competition for the same.

I regard the offer a liberal one, though not remarkably so, considering whom it comes from. I believe Mr. A. has ever been among the most liberal of those connected with the art of photography, and I wish there were more just like him in that respect. Notwithstanding the noble motives that prompts Mr. A. to such good deeds, I could not conceive a more effectual plan to obtain a fine collection of pictures, than the one adopted by him; and should the competition be as sharp as it usually is at the various Fairs held in our State, when but a worthless diploma or perhaps a medal worth five dollars has been offered as a reward for the best daguerreotype productions; or should com-

petition be in proportion to the value of the prize offered, I would cheerfully take Mr. A's place, pay for the pitcher, and become master of the gems of art. I have said that Mr. A's. offer was liberal, and it is very liberal, but perhaps not altogether democratic; it bears a feature of the property qualification act, and if Mr. A. will but give the subject a moment's reflection, he will readily see that a great portion of clever artists are disfranchised; fortune has not equally smiled on all; all have not the means to purchase double whole cameras, and no one with but a miniature camera will suffer his productions to come in competition with those made by lenses of four times the power. If the pitcher is not yet ordered (and I presume it is not) I would suggest the following plan. Instead of one large prize, give three smaller ones, making the three equal in value to the one now offered. For the best full size daguerreotype offered, give a pitcher worth one half of the whole amount, and for the best half and also best fourth plate, divide the remaining half of the sum. I have no

doubt but that by this plan Mr. A. would succeed in creating an interest among photographers, and that his generous offer would be appreciated. I am willing to enter the course on other conditions, if Mr. A. will exclude the double whole size camera, and require the plates to be worked with the ordinary whole size lenses. In that case I am willing to strive for victory, or I am willing to enter on any terms that gives to all an equal chance. If the whole size picture was the only size demanded, I confess my views of Mr. A.'s offer would be altogether absurd, but inasmuch as the half and fourth plates are of much greater importance (computing their worth by the demand for them) than the whole size, I feel that even in Mr. A.'s mammoth fair, it would be well to recognise them as of some consequence. I hope what I have written will not be misconstrued. I have not the least desire to dictate to Mr. A. in his own matters, I merely suggest the above, which perhaps Mr. A. may think worthy of consideration: nor do I wish to stay the tide of enthusiasm already kindled in expectation of winning the splendid prize. I delight to see such things go on. The faster the car moves the better I am pleased, though I am not a passenger on board. Your sincere friend,

D. D. T. DAVIE.

Utica, Aug. 7th, '52.

Mr. Harrison has handed us the following, on the same subject, for publication.

MR. E. ANTHONY.—Dear Sir:—I perceive by a statement in the Photographic Art-Journal, that you offer a very handsome prize for the best daguerreotype that can be produced prior to the first of November, 1853. I conceive it useless for me or any one to eulogise your conduct in this matter; the many beautiful results that will flow from the enterprise must in the end produce much advancement in the beautiful and useful art, and to you, when contemplating these fruits, it must inevitably be a means of much pleasure.

The fraternity have now a noble chance to show how much *genius* exists in the rank and file of the profession—and should they not respond to the occasion as it behoves them, they will certainly achieve for themselves an immortal mass of shame and

obloquy. There are one or two points in your proposition which I should like you to have explained, as I think it material that every one should understand distinctly the precise terms on which they are to take up the gauntlet; you say the daguerreotype is to be of the whole plate size “6½ by 8½ inches” but do not state whether the taking of the picture is strictly confined to the *whole plate camera*, which should be the case, as many will take advantage and use the double whole plate tube, thereby gaining many nice little points in the production, which to the discriminating judges whom you have appointed, might turn the scale against those who have not the same advantage. We all know that a whole plate camera is apt to take a better half plate picture (I am speaking now of good instruments) than a half plate camera, and I think that the same rule holds good with the double whole instrument.

“Every competitor must be a member of one of the Photographic Societies;” good. I was elected a member of the New York State Society many months since, but have never received a copy of its constitution, nor been asked for the initiation fee and monthly dues; will you, or the worthy editor of the Photographic Art-Journal, throw some light on the subject, as I wish to be “a member in good standing.” In conclusion, I beg of you to place my name on the list of champions for the prize, earnestly do I enter the ranks, and most hard shall I try to be the victor, not so much for the value of the metal at stake, as to have it said on the occasion I took the best daguerreotype, “simple” as the art may seem to many, and as “unnecessary” as it may appear to the same individual who does not see the utility of having a Journal devoted to the advancement of the art.

With the highest respect,

GABRIEL HARRISON.

COPYING DAGUERREOTYPES.

Oswego, August, 1852.

H. H. SNELLING, ESQ.—Dear Sir: I was much pleased with a letter from N. G. Burgess, Esq., published in the July No. of your Journal, detailing the experiments and success of Mr. Geo. S. Cooke, of Charleston, in copying a daguerreotype

eight times the size of the original. In accordance with Mr. B's. suggestions I beg to add my mite to the general stock of information on this subject. Copying pictures has become a large share of the daguerrean business, and is constantly increasing, and it is well to bring this branch of the art to perfection as soon as possible.

Near the close of his letter, Mr. Burgess indulges in the belief "that there certainly can be some new arrangement of camera boxes whereby the light can be made to fall upon the original so as to avoid all reflections and produce copies equal to the original."

The chief difficulties in making copies have been that the copy is produced in a much lower tone—that is, the lights and shades are much weaker—and that, in the copy, the lines are not so sharp and distinct as in the original. The freshness and brilliancy of a fine tone daguerreotype I

fear can never be imparted to the copy, but we can produce one as clear, distinct and strong as the original; further than this cannot be expected of us.

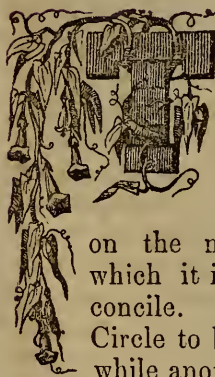
In my process I use a whole sized camera with an aperture in the diaphragm about the size of a dime, and I place the picture to be copied directly in the sunshine, by which all reflections will certainly be avoided—because the direct light is stronger than the reflected lights.

Reducing the size of the aperture in the diaphragm produces the sharpness and distinctness of the original, and in aid to this, and to obtain the same strength of light and shade, I use a smaller quantity of bromide in the preparation of the plates. Others may have adopted this process, but I believe that it is not generally known.

Hoping that this may be of some service, I am, Truly yours,

GEO. N. BARNARD.

NATURAL PHILOSOPHY OF THE BEAUTIFUL.*



O determine the nature of beauty is a task of exceeding difficulty, nor do we intend to attempt the solution of the perplexing problem on the present occasion. Differences exist on the most fundamental points, which it is useless to attempt to reconcile. One man will declare the Circle to be the most beautiful form, while another will obstinately maintain that the element of all beauty is in the Ellipse; and again, a third person will declare some other geometric figure more beautiful than either. There has always been some theory of harmonic ratios float-

ing in the human mind; Galileo suffered because he attempted to show that there were more than the harmonious number of planets; and Sir Isaac Newton allowed himself by a lingering mysticism, which clung to the numeral seven, even in that master-mind, to fix upon it as representing the number of the colored rays indicated by the prism as constituting white light, when but for this cloud that great philosopher would have assuredly found them to be either more or less than that number.

Ærsted the Danish philosopher, to whom the world is indebted for the Electric Telegraph, which now binds kingdoms in the bonds of brotherhood, and chains the islands of the seas together as one land, has several chapters in his "Soul in Nature" devoted to the consideration of this subject. As many of the remarks of the sage have a very important meaning for the artist, we have been induced to devote a portion of our space to its consideration.

Hans Christian Ærsted, was one of those

* "The Soul in Nature, with supplementary contributions," by Hans Christian Ærsted, translated from the German by Leonora and Joanna B. Horner. Henry Bohn, London. "Form and Sound, can their beauty be dependent on the same physical laws?" by Thomas Purdie. Adam and Charles Black, Edinburgh.

minds which shrouds themselves in their humility, and pass away from the earth without mankind having discovered that something approaching to divinity had been among them. He worked diligently in his vocation as a teacher, and a close observer and accurate experimentalist he was equalled by few, excelled by none. To his observation that a magnetic needle always placed itself at right angles to the line of an electric current we owe, as we have stated, the means of sending our thoughts across sea and land with a speed which far exceeds the flight of time. There is something very delightful in finding such a mind leaving the merely mechanical, looking for the "Soul in Nature," the *inner beauty* which dwells in all creation, and endeavoring to discover the elements of the Beautiful by the aid of Natural Philosophy.

After a careful examination of the lines and figures which express thought, in which we are told that the straight line, the circle, and figures formed of straight lines of equal size are pleasing to the eye, especially when contrasted with careless scribbled strokes, the philosopher proceeds to an examination of the connection between a mental perception and mere sensual apprehension. "Every apparent object, however simple, contains a variety (we may almost say, an affinity) of thoughts which thought must elaborate by separation, union and arrangement, before it can grasp it in its oneness." There is no changing of beauty by any mathematical laws; the geometer may endeavor in vain to produce it by his rigid rules of symmetry, unless he adds something more than this. Nature does not confine herself to the production of mere mathematical forms. She adds far more. —If we throw a stone in still water, and follow with our eye the circle of waves which is produced, the impression at once teaches us, that we have not alone to do with mere circles, but that these are exhibited to us in a concentric progress of elevations and depressions. We have not passive but moving forms before us. A closer investigation shows us that the portions move in their own circular path, or in vibrations, so that what meets the eye is the result of the innumerable inward movements. The same investigation also shows, that all these happen according to universal laws of nature.

But to this we must add the co-operation of the rest of nature with those effects which are merely the consequence of the expansion of movements. It is a light, as it were, beaming in from the rest of nature. The brightness in the expanse of water, the variety of light and shadow in the portions of the waves, the play of color produced by the motion, give a life and completeness to the whole, which was wanting in mathematical figures."

This reasoning is of much the same character as that of Mr. Purdie, whose work on "Form and Sound" we have read with satisfaction. "The soul of man in seeking relief from the cares, the endless toils of his existence, would have found but the bitter waters of the well of Marah to quench his thirst for happiness, but for that inner soul which spreads beauty over all things. Not less wise than merciful, is the provision that has been made for the wants and weaknesses of man by the divine intelligence which formed the whole economy of his nature. The hidden fountains of joy lie within the heart, and creation teems with objects and influences designed to call them from their lurking place. The rock has only to be struck, and living streams gush forth, which convert the wilderness into a fruitful field, and make the desert to rejoice, and blossom as the rose." The geometers of antiquity sought to explain certain fixed lines of beauty, as the sources of all pleasurable sensation as derived from external nature and in our own day we have found those who contend that nature has worked with a certain curved line, by combinations of which everything beautiful has been created. It is pleasing therefore, to find an acute natural philosopher examining the subject upon purely inductive principles, and determining that "the poetic spirit has its influence on our comprehension of beauty." A passage from Oersted's Essay "On the Unbeautiful in Nature," will fully explain his views.

"We consider the swan beautiful, but that would hardly be the case, if we had not become accustomed to view it through the oneness of all the impressions in which we habitually see it. The celebrated orator Burke, whose thoughts on the beautiful have gained a degree of reputation which is certainly undeserved, employed, among other things, the universal acknowledged

beauty of the swan to support his opinion that beauty does not in the least depend upon figure, that it does not *alone* depend on it was not sufficient for him. We will not dwell any longer on his views of the question, but we will employ the swan as an example, to explain the meaning of the natural position of an object, with respect to the apprehension of beauty. Let us imagine a man so situated that he had never seen a water bird; let him see a swan for the first time in a poultry-yard among the other fowls, and deprived of any access to any large piece of water, in which he could clean his feathers and preserve their dazzling whiteness—would he then think him beautiful? He would perhaps admire the graceful curve which the neck assumes in certain positions, and the red beak; but he would be struck with its imperfect equilibrium, and would say there was a wondrous disproportion between the long neck and the short tail, with the short legs and broad feet, which cause such a waddling gait; but let him now see it swimming on the water in its proper and natural position, and he will hardly recognize it. In general it is only when seen on a quiet piece of water, in which it is reflected, that we observe the swan with sufficient accuracy; and joined to the reflection, it offers a most beautiful symmetrical figure. Its feathers constantly kept clean by the water, exhibit themselves here in their dazzling whiteness, and form a beautiful combination with the broad red bill, and the dark eye which appears between the red and white; besides this, all want of equilibrium has now disappeared. The water supports the tail, it is only an exception when it is supported by the legs. The neck, which even in its curved posture is very beautiful in itself contributes to the equilibrium of this position, while the swan glides slowly and majestically over the surface of the

water. The imagination adds still more to this almost direct impression of beauty. A notion of purity is awakened within us by the whiteness, and, since whiteness and purity are symbols of spiritual qualities, we receive this impression imperceptibly, although we by no means attribute these perfections to the animal itself, but it becomes a symbol to us of something higher than what we directly behold in the object.

“From another side imagination adds to these new ideas; while we behold the half-raised wings of the swan, we immediately think of its similitude to a distant ship, and of its power to fly. The impression we receive from the whole phenomenon contains something of the sublime and the powerful, of the pure and the harmonious which is often increased by the brilliancy of the water itself, and by a background of green trees. It is only with some few that the legend of antiquity about the song of the swan, and that this bird was dedicated to Apollo, will add still more to the impression.”

The beautiful is comprehended, and, so far as it originates from ourselves is created by the faculties of sense. “The inner sense” apprehends things in a direct manner, its principal object will be figures which express simple thoughts, symmetry, even of very involved forms, shadows, and relations of colors; the motion of sound (rhythm) and the more simple relations and movements of tones.—This applies equally to Art as to Nature, to Art-manufacture as to the creations of imagination, or the productions reflected from external nature through the artist’s mind to his canvas. Although the symmetrical may be beautiful, still symmetry does not always constitute beauty. It must comprehend that “*inner sense*,” which it is the purpose of the “Soul in Nature” to examine.—*London Art-Journal.*

DESCRIPTION OF SEVERAL PRISM-STEREOSCOPES AND A SIMPLE MIRROR-STEREOSCOPE.



WHEN stereoscopic drawings are executed in white lines upon a black ground, a weak image, arising from the reflection which takes place at the uncovered forward surface of the glass, often mixes itself with the principal image reflected from the silvered surface behind. To prevent the appearance of such images, total or metallic reflection is necessary. In stereoscopic investigations, where the contours of the images do not exactly coincide, a doubt may arise whether this be not due to the imperfection of the drawings made use of. The desire to set aside this possible source of error has led to the construction of the following stereoscopes.

Prism-stereoscope consisting of one Prism and one Drawing, intended for a single eye.

The condition of complete identity can only be fulfilled when one object, and not two is observed. An object seen in a looking-glass appears reversed as regards right and left. In all stereoscopic drawings, which differ only in the circumstance that one is a reflected image of the other (and to this class belong the greatest number, even the most complicated of those hitherto executed), the reflected image of the object can take the place of the second drawing. Such drawings may be named *simple reversions*, in contradistinction to those in which a plane perpendicular to the line which joins both eyes and passing through the centre of the body does not divide the latter symmetrically. If an erect object be viewed through a prism whose ends are right angled isosceles triangles, the prism being so placed that its plane of refraction is horizontal, that is to say, with its hypotenuse surface vertical, the object will remain erect; but with regard to right and left, it will be found to have changed sides. Through such a prism, therefore, the arranged type in a printer's workshop may be read as the page of a

common book; the letters change places right and left, and thus appear as when they are printed. In the same way a profile is reversed. If a common stereoscopic drawing intended for the left eye be viewed by the right eye through such a prism, then, if the projections be simple reversions of each other, the image will appear as if designed for the right eye. To the left or naked eye, the drawing appears unchanged. It is easy, by turning the prism round one of the edges which stands perpendicular to the plane of refraction, to cause both images to coincide: the moment this takes place, the relief starts into existence with surprising sharpness.

If the position of the drawing remain unchanged, and the prism be held before the left eye, then if the object be conceived to be transparent, so that both its exterior and interior surfaces are visible, the forward surface will appear converted into the surface behind, and *vice versa*. When, on the contrary, a drawing intended for the right eye is viewed through the prism by the left eye, it will appear exactly as in the first case, always provided that it is viewed at the same time by the naked right eye. If the drawing represents a body which like a pyramid or the frustum of a pyramid, appears with regard to the surface of the paper either as *convex* or *concave* relief, then the said drawing viewed through the prism with one eye, and with the other eye naked, will appear in *convex* relief; when the prism is held before the other eye, the stereoscopic combination of both images give rise to a *concave* relief. If the drawing be turned in its own plane while the prism remains before the same eye, a rotation of 90° causes the coincidence of the images to appear as a plane projection. A rotation of 180° , on the contrary, changes it from *concave* to *convex*. During the rotation, the hypotenuse surface must stand perpendicular, or nearly so, to the observed drawing.

With regard to the dimensions of the prism, for holding freely in the hand, an inch in length for the two equal sides of the isosceles triangle at the end, and three-quar-

ters of an inch in width, will be found convenient proportions. When fastened in a cylindrical tube attached to a stand, which permits of its being raised and lowered, a prism will be found sufficiently large in which the height of the right angled triangle does not quite amount to two lines.

Prism-stereoscope consisting of one Prism and two Drawings.

The stereoscope just described fulfills the condition of the complete identity of both projections, and besides this, possesses the advantage of a total reflection, by which incidental images are avoided; but it is applicable to simple reversions only. The following instrument is free from this limitation. In simple reversions, two copies of the same drawing are laid side by side. One of them is viewed through the prism, and the image thus obtained is projected upon the other which is viewed with the naked eye. When the drawings are unsymmetrical, that intended for the right eye is placed right, and viewed through the prism held before the right eye; the image thus obtained is projected upon the second drawing, which is observed by the naked left eye, and which must be a copy of the looking glass image of the drawing intended for the left eye in the common stereoscope.

Prism-stereoscope consisting of a Reversion-prism and two Drawings.

The reversion-prism reverses an object completely, as well in respect to right and left as to top and bottom. The unsymmetrical projections intended for the common stereoscope are placed in reversed positions beside each other, and the image seen through the reversion-prism is projected upon the other drawing which is observed with the naked eye.

Prism-stereoscope consisting of two Prisms and two Drawings.

Two equal inosceles right-angled prisms are held one before each eye, so that the hypotenuse surfaces are vertical—best so that the hypotenuse surfaces face each other—and by inclining the prisms, the images of the two drawings placed side by side are brought to coincidence. This stereoscope, like the eye is applicable to all drawings; when the prisms are fixed in

cylindrical tubes and attached to a stand the arrangement is exceedingly convenient.

Mirror-stereoscope with two Drawings and a plane metallic Mirror or reflecting Prism.

The drawing intended for the left eye is laid horizontal, and is viewed with the naked left eye. Before the right eye is held a small metallic mirror or a reflecting prism; and in the case of simple figures, another copy of the same drawing is observed in a vertical plane. For an unsymmetrical figure, a drawing which is the reflected image of that intended for the right eye must be used.

Double-seeing, as a Stereoscope.

Those who have accustomed themselves to double-seeing, when two stereoscopic drawings are laid side by side, can obtain four images in a direction parallel to a line joining both eyes. The two central images can be brought to coincidence, the relief being thus obtained between its two projections. A most peculiar impression is caused by the union of the two images in the relief. When brought near, they seem to rush together with an accelerated velocity, as if they more strongly attracted each other. In a similar manner, when two persons lay their foreheads together and look into each other's eyes, each observes the eyes of the other to run together into one large eye in the centre of the forehead.

In the application of the stereoscopes above described, it is observed in a striking manner, particularly when the drawings are viewed from some distance, that by exchanging the projections, the height of the convex relief appears less than the depth of the concave. The plane of the paper on which, as ground surface, the drawing is executed, is seen at the same distance in both cases. That this is the cause of the phenomenon is proved by the fact that the side surfaces of the frustum of a pyramid, stereoscopically observed, seem to be less steeply inclined towards the base when the top of the frustum is nearest the eye, than when it falls at the other side of the base, and is viewed through the hollow prism. The top surface of the frustum is seen in both cases under the same angle; but in the second case we imagine that it

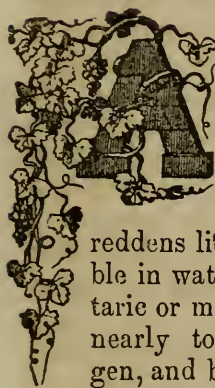
lies further away. Hence the idea of a larger surface seen at a greater distance, and the apparent diminution of the inclination.

This explanation is corroborated by the following experiment: a small gypsum bust was placed before a polished hollow mirror so that the reversed image seen with both eyes fell beside the bust. Without changing the position of the right eye, the left eye was closed. The image receded im-

mediately to the surface of the mirror, and appeared much larger; it was observed under the same angle, but fancied to be at a greater distance.

In comparative stereoscopic investigations the drawings most always stand at equal distances. It is a proof that the combination is good if, when the head is moved slowly to and fro, the relief is set in slow oscillatory motion.—*Philosophical Mag.*

ON ACIDS. III.—MINERAL ACIDS.*



ANTIMONIC ACID.—This is an acid formed by the combination of antimony and oxygen; it is the metal in the highest state of oxidation. The hydrated acid—freshly precipitated—reddens litmus paper, and is insoluble in water, unless soured with tartaric or muriatic acid. When heated nearly to redness, it gives out oxygen, and becomes antimonious acid.

The hydrated acid is a white powder; the anhydrous acid is of a pale yellow color, and is insoluble in water even with the assistance of other acids. It forms with the bases salts called antimoniates.

It is prepared in two ways. First, by digesting metallic antimony in strong nitric acid, or by dissolving it in nitro-muriatic acid; then evaporate by heat until the excess of acid is expelled, and throw the solution into cold water. The precipitate is the hydrated acid, which by exposure to a heat of about 500° F. is freed from water and the anhydrous acid remains behind.

Second.—By mixing powdered metallic antimony with six times its weight of nitre, igniting it in a silver crucible, and when cold, wash out the excess of alkali with hot water. The remaining antimoniate of potash is then decomposed by muriatic acid, and yields an insoluble antimonie acid.

ANTIMONIOUS ACID.—This acid differs only from the above in containing one equivalent less of oxygen. It is white, very infusible; insoluble in water, and also in acids, after being heated to redness. It combines with the bases, forming salts called antimonates. The hydrated acid reddens litmus, and dissolves in muriatic and tartaric acids. It is prepared in three ways:—

First. Expose the white hydrated antimonie acid to a red heat, when one equivalent of oxygen will be driven off with the water, and pure antimonious acid will remain.

Second. Either the oxide or sulphuret of antimony, exposed to a strong heat, long contained in open vessels, gradually absorbs oxygen, and passes into antimonious acid.

Third. The hydrated acid may be prepared by adding an acid to the antimonite of an alkali.

ARSENIC ACID.—The combinations of this acid was first noticed by Marquer, but we are indebted to Scheele for the subsequent discovery of the acid. It is formed by the combination of metallic arsenic with oxygen, one equivalent of the former to three of the latter, constituting its component parts. It is sour to the taste, reddens litmus paper, dissolves in six times its weight of cold, and twice its weight of hot water, and forms salts with the bases called arseniates. By careful evaporation it may

* Continued from page 88, Vol. 4, No. 2.

be obtained under the form of small grains, but is usually met with as a syrup. It is deliquescent, and is a most violent poison. Its presence may be detected by sulphuretted hydrogen, which gives a yellow precipitate; by nitrate of silver which gives a brick-red precipitate; or by the nitrate of lead which gives a white one. It is made by two methods:—

First. Pour six parts of strong nitric acid upon one part of white arsenic, in a glass vessel, and distill until the solution acquires the consistence of a syrup, then transfer it into a platina crucible, and expose it for some time to a faint, dull, red heat, to expell the nitric acid. The process may be facilitated by adding a little muriatic acid.

Second. Submit arsenious acid to the action of aqueous chlorine.

ARSENIOUS ACID.—This substance, like the preceding, is a compound of metallic arsenic and oxygen, and is a powerful poison; in fact, one of the most virulent of the class to which it belongs. Some authors assert that it has a sour taste, while others affirm that it is sweet. It has an acid reaction, which is very obvious when the acid in powder is moistened and placed upon litmus paper. When sublimed slowly, it crystalizes in octahedral crystals of a yellowish, transparent color, and when suddenly heated it fuses into a transparent brittle glass, the specific gravity of which is 3.7. One thousand parts of boiling water dissolve 77.75 grains of the acid, and when the solution is cooled to 60° F., it contains only 30 grains.

This acid is prepared by digesting metallic arsenic in diluted nitric acid; or by heating metallic arsenic in open vessels.

Persons poisoned by arsenic in any form should immediately swallow the hydrated sesquioxide of iron, in the gelatinous state, in doses of a table-spoonful every ten minutes.

BORACIC ACID.—This acid contains one equivalent of boron and two of oxygen. It is obtained by dissolving borax; or the baborate of soda in boiling water, and then adding very dilute sulphuric acid until the mixture becomes sour. In this process the sulphuric acid combines with the soda, and sets at liberty the boracic acid, which crystalizes by evaporation in thin scales of a shining appearance. Boracic acid has

a bitter sour taste, is soluble in water and alcohol, reddens vegetable blues, and turns tumeric paper brown. When deprived of its water it crystalizes by a high temperature, and is easily fused.

BROMBENZOIC ACID.—A new acid, discovered by Peligot, and prepared by exposing benzoate of silver to the vapors of bromine, until they cease to be absorbed, when the acid is dissolved out with ether, and obtained by evaporation.

CARBONIC ACID.—Consists of two equivalents of oxygen, and one of carbon. It is widely distributed throughout all nature, and is readily procured by pouring an equal bulk of muriatic acid diluted with water upon small pieces of marble. Carbonic acid is gaseous at all temperatures, under ordinary pressure, but it has been rendered liquid by a pressure equal to thirty-six atmospheres. It is a transparent colorless gas, incombustible, and incapable of supporting combustion or respiration. It is heavier than atmospheric air, which may be readily seen by pouring it from one jar into another; and if a lighted candle be placed in the lower vessel its destructive nature may be seen, as the the candle will be immediately extinguished. It is soluble in water, that fluid taking up rather more than its own volume.

The aqueous solution of carbonic acid reddens litmus, and imparts a degree of briskness and sparkling to the fluid: when added in small quantities to lime water, the mixture becomes turbid; but if a large quantity be added, the solution will again become clear. Carbonic acid unites with the bases, forming a series of important salts; it has, however, but a very weak affinity, for the base being decomposed by most other acids, the carbonic acid flies off with effervescence.

CHROMIC ACID.—This is a compound of the metal chromium and oxygen; one equivalent of the former being added to 2½ of the latter. It is prepared in several ways, from which we select the following:

Transmit the gaseous fluoride of chromium into water contained in a platinum or silver vessel, and then evaporate the liquid to dryness; or to a saturated solution of 100 parts of chromate of potash in water, add 49 parts sulphuric acid, (sp. gr. 1:845). This is the common process, but the product contains sulphate of potash.

Mr. Charles Watts, Jr., recommends chromate of lime as a source of chromic acid. This salt he prepares from the oxide of chromium, contained in the residual liquor of the process of bleaching with chromic acid, and this he effects by a very inexpensive process.

The chromic solution is placed in a wooden vessel, and slacked lime cautiously added until the sulphuric or muriatic acid present is saturated, carefully avoiding excess, as oxide of chrome would be then precipitated. After an hour's repose the clear portion is decanted, and finely slacked lime is added, until all the oxide is thrown down; which may be known by the liquor becoming clear when allowed to settle. During the addition of the lime, constant agitation must be employed. The oxide of chromium must now be allowed to settle, and after the liquid portion is decanted, washed with a few pailfuls of clean water. After the latter has drained off, the residual mixture of oxide of chromium and lime must then be placed about two inches thick upon a large flat iron plate, set evenly over a fire, and turned every half hour until the process be completed, which may be known by the mass assuming a yellow color, instead of the grayish one it previously possessed. Care must be taken not to employ too much heat, as the product of this process (chromate of lime) is readily decomposed, and assumes a green color, in which case it is rendered useless. From the chromate of lime the acid is procured by the action of an equivalent portion of sulphuric acid. This process has the great recommendation of cheapness, and Mr. Watts says he has employed it in the factory of Messrs. Hawes, for nearly two years with perfect success.

Pure chromic acid forms red crystals, and is soluble in water and alcohol. It is readily decomposed by the action of light and contact with organic matter; hence it should be kept in stoppered glass bottles, and its solution filtered through asbestos. The ease with which it parts with its oxygen constitutes its value as a bleaching agent.

COLUMBIUM ACID.—The metal *columbium*—a rare metal—exists in its ores in the form of an acid, united to iron, manganese, or yttria, and from these it may be obtained by fusion with three or four parts

of potash, solution in water, and precipitation with an acid. It falls as a white powder or hydrate.

CYANIC ACID.—A compound of cyanogen and oxygen, discovered by Wöhler. It is only known in the hydrated state, or united to one atom of water. To prepare it pass distilled dry cyanuric acid, or cyanamide, in a retort, and collect the product in a well cooled receiver; or nitrogen may be transmitted over carbonate of potassa heated to redness; a cyanate of potassa results. This acid reddens litmus, is sour to the taste and possesses the smell which is always perceived when any of its salts are decomposed by an acid. It neutralizes bases perfectly, forming salts called cyanates, but when in contact with water it suffers decomposition in a few hours, and is converted into carbonic acid gas and ammonia.

FERRIC ACID.—This acid has only been obtained combined with potassa, forming a *ferrate* or *perferrate* of that alkali. Fremy, the discoverer of this new compound, prepared it by calcining a mixture of the peroxides of iron and potassium, or by igniting a mixture of potassa and oxide of iron, or by injecting nitre or iron in fine powder, and heated to redness in a crucible.

The following form will, however, be found more convenient and certain.—

Finely pulverized iron filings, 2 dr.; pulverized saltpetre, 4 dr.; mix, place it in an 8 or 10 oz. crucible, heated to a glowing red, still standing on red hot coals, and when combination takes place on one side—shown by the evolution of light and white fumes—remove it from the fire. As soon as the deflagration of the mixture has ceased, scrape out the mass on to a cold plate, by means of an iron spatula. The product is a dark reddish mass, forming a superb cherry red solution with water, which quickly undergoes decomposition, depositing sesquioxide of iron, and evolving pure oxygen.

FERROCYANIC ACID.—This acid is decomposed by heat and moisture when in contact with the air; it reddens the vegetable blues, and neutralizes the salifiable bases. With the metallic oxides it forms the compounds termed ferrocyanides, ferrocyanates, hydroferrocyanates, or prussiates. It is prepared by decomposing fer-

roeyanate of potash as follows:—To 50 parts of the ferrocyanate of potash dissolved in a very small quantity of water, add 58 parts of crystalized tartaric acid dissolved in alcohol. The acid combines with and forms the bitartrate of potassa, which crystalizes in small grains, the ferrocyanic acid remaining in solution. There are other methods of preparing this acid, but this is the most simple and readily executed.

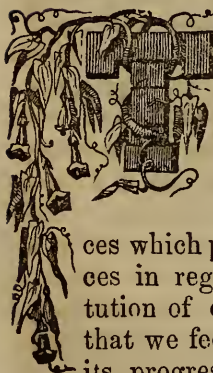
HYDRIODIC ACID.—This acid is composed of 1 equivalent of hydrogen and 125 of iodine. It is obtained in solution by suspending finely powdered iodine in water, and passing through it a current of sulphuretted hydrogen gas. The hydrogen unites with the iodine, and precipitates the sulphur. The fluid must be filtered and evaporated by a moderate temperature to the specific gravity of 1.5, and then continue the action of heat until its boiling point rises to 260°. Or you may pour a little water over some periodide of phosphorus, previously put into a glass retort, and apply a gentle heat, when hydriodic

acid will be evolved, and phosphoric acid remain behind. The gas may be either collected over mercury, or passed into water, when liquid hydriodic acid will be formed. It is a transparent colorless liquid, possessing strong acid powers, effervescing with carbonates. When exposed to air and light it is partially decomposed, hydrogen escapes, and iodine is precipitated.

HYDROBROMIC ACID.—A compound existing ready formed in combination with magnesia in the bittern of sea-salt, consisting of 75 equivalents of bromine and 1 of hydrogen. It may be prepared from the bromide of phosphorus in a similar way to that for forming hydriodic acid, or it may also be prepared by decomposing bromide of barium with sulphuric acid. It should either be collected in dry glass bottles, or over mercury in the pneumatic trough. When passed into water it forms liquid hydrobromic acid. It is soluble in water, is decomposed by chlorine, and partly so by nitric acid. The nitro-hydrobromic acid has the property of dissolving gold.

TO BE CONTINUED.

PHOTOGRAPHY.—ITS ORIGIN, PROGRESS, AND PRESENT STATE.



THE importance of Photography, whether we consider it simply in its relation to art, or as an aid to those investigations which promise to advance our knowledge of those radiant forces which perform most important offices in regulating the physical constitution of organic matter, is so great, that we feel some historical notices of its progress cannot be otherwise than interesting to our readers.

The slow advancement of abstract truth is exemplified in a very remarkable manner in the department of science which is devoted to the consideration of the physical phenomena of the sunbeam. It is tolerably certain that in the 16th century the darkening of horn silver (*fused chloride of*

silver) was observed by the alchemists; but it was not until the 18th century that any examination of the phenomenon was made. Even then the influence of light on the crystalization of salts first attracted attention, and memoirs on this subject were published by Petit in 1722, by Chaptal in 1788, and by Dize in 1789.

In 1777, Scheele, the celebrated chemist of Sweden, writes:—"Fix a glass prism at the window, and let the refracted sunbeams fall on the floor. In the colored light put a paper strewed with *luna cornua* and you will observe that this horn silver grows sooner black in the violet ray than in any of the other rays." Senebier, in 1790, ascertained that this white salt of silver darkened in the violet ray in fifteen seconds to a shade which required the action of the red ray for twenty minutes. In

1801, Ritter, of Jena, demonstrated the existence of rays beyond the spectrum, having no illuminating power, but possessing active chemical properties. A similar set of researches were undertaken by Dr. Wollaston about the same time, which also proved the remarkable differences existing between the differently colored rays.

These researches led the way to the experiments of Wedgwood, the celebrated porcelain manufacturer of Etruria, in Staffordshire, which, beyond all dispute, must establish him as the first photographic artist. From the journal of the Royal Institution of 1803 we copy the title of Mr. Wedgwood's memoir, and a few of his remarks, with the notes of Sir Humphry Davy:—

“An account of a Method of Copying Paintings upon Glass, and of making Profiles by the Agency of Light upon Nitrate of Silver with Observations by Humphry Davy” A solution of nitrate of silver spread on white paper or white leather was the photographic material employed; and he remarks—“The alterations of colors take place more speedily in proportion as the light is more intense. In the direct rays of the sun, two or three minutes are sufficient to produce the full effect; in the shades several hours are required; and light transmitted through different colored glasses, acts upon it with different degrees of intensity. When the shadow of any figure is thrown upon the prepared surface the part concealed by it remains white, and the other parts speedily become dark. For copying paintings on glass, the solution should be applied on leather; and in this case it is more readily acted on than when paper is used. After the color has been once fixed on leather or paper, it cannot be removed by the application of water, or water and soap, *and it is in a high degree permanent*. Besides the applications of this method of copying that have just been mentioned, there are many others; and it will be useful for making delineations of all such objects as are possessed of a texture partly opaque and partly transparent. The woody fibre of leaves, and the wings of insects, may be pretty accurately represented by means of it; and in this case it is only necessary to cause the direct solar light to pass through them, and to receive the shadows upon prepared leather.” Sir

Humphry Davy adds, “*The images formed by means of a camera-obscura have been found to be too faint to produce in any moderate time an effect upon the nitrate of silver. To copy these images was the first object of Mr. Wedgwood in his researches on this subject.* In following these processes I have found that the images of small objects produced by means of the solar microscope may be copied without difficulty on prepared paper. In comparing the effects produced by light upon muriate of silver with those produced upon nitrate, it seemed evident that the muriate was the most susceptible. Nothing but a method of preventing the unshaded parts of the delineation from being colored by exposure to the day is wanting to render this process as useful as it is elegant.”

No further investigation of the subject appears to have been made for many years. The failure on the part of Wedgwood and Davy was due entirely to the want of those chemical agencies, which were afterwards employed as the fixing materials. Hypo-sulphite of soda was not discovered by Sir John Herschel until 1819, when he at once detected and described the habitudes of the salts of silver in connexion with hyposulphuric acid. Iodine was not known before 1812, when it was discovered by Courtois, a manufacturer of saltpetre at Paris; and bromine was yet a later discovery, by M. Balard of Montpellier. Without these agents Photography could not have advanced beyond the point at which Wedgwood and Davy left it.

In 1814 M. Niepce, of Chalons, on the Saône, turned his attention to the chemical agency of light, his object being “to fix the images of the camera-obscura;” and he discovered the peculiar property of solar radiations in altering the solubility of resinous substances. By spreading bitumen on a glass or metal plate, and placing this in the camera-obscura, Niepce found that in five or six hours a *dormant image was impressed on the plate*, which was rendered evident by placing the prepared material in any solvent of the bitumen or resin employed. This development of a dormant image has been patented as though it were a new discovery of Mr. Fox Talbot, whereas it was known exactly twenty years before he commenced an experiment on the subject. Niepce resided at Kew in

1827; and still pursuing the subject, he produced many of these pictures, some of which are still in the possession of his friends in this country. They possess much of the air of Daguerreotypes, but are necessarily imperfect as pictures when compared with the Photographs which we are now producing. In 1824, Daguerre commenced his researches, employing as Wedgwood had, the nitrate and chloride of silver. In 1826, Niepce and Daguerre became acquainted, and they pursued their inquiries together; and in 1829 Niepce communicated his process to Daguerre, from which communication we must make a few extracts of great importance in the history of Photography:—

“The discovery which I have made, and to which I give the name of *Heliography*, consists in producing spontaneously, by the action of light, with gradations of tints from black to white, the images received by the camera-obscura.” He then describes his process, and says:—“The plate thus prepared must be immediately submitted to the action of the luminous fluid in the focus of the camera. But even after having been thus exposed a length of time sufficient for receiving the impression of external objects, nothing is apparent to show that these impressions exist. *The forms of the future picture remains still invisible. The next operation, then, is to disengage the shrouded imagery*, and this is accomplished by a solvent”

In 1829 iodine was first employed by Niepce and Daguerre to “black the resinous plates on which the heliographic pictures were obtained.” Daguerre appears, however, to have noticed some peculiarity in the action of light on the silver plates, as Niepce, in a letter to him, speaks of a “decoction of thapsi (shepherd's purse), fumes of phosphorus, and particularly of sulphur acting on silver in the same way as iodine, and that coloric produced the same effect by oxidizing the metal, for from *this cause proceeded in all these instances this extreme sensibility to light.*”

Niepce died in 1833; and in January, 1839, Daguerre's discovery was announced, and specimens were shown to the *élite* of Paris. In July following a bill passed the Chamber of Deputies securing to M. Daguerre a pension for life of 6000 francs, and to M. Isidore Niepce, the son of the

originator of Heliography, a pension of 4000 francs, as the purchase price of the secret of the process of Daguerreotype—*for the glory of endowing the world of science and of art with one of the most surprising discoveries that honor their native land.*” “This discovery France has adopted; from the first moment she has cherished a pride in liberally bestowing it—a gift to the whole world.” Such was the language of M. Arago, and we find M. Duchâtel saying, “*the invention does not admit of being secured by patent, for as soon as published all might avail themselves of its advantages.*” Notwithstanding these assertions, made no doubt with the utmost honesty by these distinguished Frenchmen, we find M. Daguerre trafficking in the English patent market; and on the 15th July, 1839, Mr. Miles Berry patents for “*a certain foreigner residing in France,*” this process which her Minister declares cannot be patented.

The Daguerreotype patent has nearly expired, and, from the circumstance that some points of legality remain undecided, it may already be regarded as having run its period.

On the 31st of January, 1839, Mr. Fox Talbot published “Some account of the Art of Photogenic Drawing;” and on the 21st February, 1839, he gave the mode of preparing the paper employed. This included a mode of covering paper with chloride of silver, which he rendered, by repeated washings, sufficiently sensitive for the camera-obscura. There we have the same agent used as Davy recommended to Wedgwood, and employed himself, there being scarcely any difference in the manipulation recommended. Mr. Talbot advised the fixing of these pictures by a solution of common salt, but this was of the most imperfect kind—the pictures turning blue in the white parts after the slightest exposure.

The next publication in order of date, of any novelty was that of Sir John Herschel to the Royal Society, 14th March, 1839, which was followed by the admirable memoir on the “Chemical Action of the Rays of the Solar Spectrum,” &c., read 21st February, 1840. In the first of these, Sir John Herschel recommends the use of the *hyposulphite of soda* as a fixing agent; and, in the second, he advises its being used *hot* for iodide of silver, as being less

soluble in it than the chloride. Sir John Herschel also introduced the use of the hydriodate of potash for the purpose of converting the dark oxide into iodide of silver and what is still more to the purpose, published the peculiarities of "*iodized paper*". We quote his words;—"The preparation of this paper (with hydriodate of potash and nitrate of silver) is very variable in its results, according to the strength of the solutions used. If strong solutions of the hydriodate be used, it is nearly or quite insensible; if weak, the reverse."

At the meeting of the British Association at Plymouth, in July, 1841, Mr. Robert Hunt made a communication "On the influence of the Ferrocyanate of Potash on the Iodide of Silver, producing a highly sensitive Photographic preparation," in which he gave particular directions for the preparation of *iodized paper*, as follows:—Highly glazed letter-paper is washed over with a solution of one drachm of nitrate of silver to an ounce of distilled water; it is

quickly dried, and a second time washed with the same solution. It is then, when dry, placed for a minute in a solution of two drachms of the hydriodate of potash in six ounces of water, placed on a smooth board, gently washed, by allowing some water to flow over it, and dried in the dark, at common temperatures."

Iodized paper was also employed by Mr. Ryan, Lassaigne, and others, from which it appears quite certain that any dealer in Photographic materials may make and sell any of the iodized papers prepared as published by Sir John Herschel, Mr. R. Hunt, or others, previously to the date of the Calotype patent.

In Sir John Herschel's paper, already referred to, we find particular mention of the use of *gallic acid* as an exciting agent; but this able experimentalist, says that he failed "*of any marked success in this line, with the somewhat problematical exception of gallic acid and its compounds.*"

TO BE CONTINUED.

A NEW THEORETICAL AND PRACTICAL TREATISE

ON PHOTOGRAPHY UPON PAPER AND GLASS.

BY GUSTAVE LE GRAY.

Translated from the French by J. R. Snelling, M. D.

THIRD OPERATION.

Exposition in the Camera-Obscura.



LACE the image exactly at the focus upon the ground glass, seeking the greatest clearness for the part intermediate between the first and last plane, which constitutes usually the principal point of the subject to be represented.

There is a point where the image appears clear in all its parts. In taking a picture we should seek for this point, making due allowance for thickness of the papers. I cannot lay

down any precise rules to guide you in regard to the time of exposition to light. Experience alone can properly direct you in this particular. All the beauty of a picture depends upon the time of exposition. I cannot, therefore, too urgently call your attention to it.

For a portrait in the shade with the sensitive preparation (§9), and the whole size object-glass, and double glasses of 8 centimetres in diameter, I have made the exposition from five seconds to one minute; from one to ten seconds in the sun, and with the waxed paper, used dry, from fifteen seconds to one minute in the shade.

For landscape with the dry waxed paper, and with a simple but perfect object-

glass, and a diaphragm of from fifteen to twenty millimetres in diameter, should be from thirty seconds to twenty minutes in the sun, according to its intensity and the season. The exposure ought to vary also according to the color of the objects to be reproduced. For instance, with a uniform light, a monument would require thirty seconds of exposition, while it would demand perhaps twenty minutes to reproduce trees in the forest.

Heat is likewise a great cause of acceleration. Thus, by heating the slate which bears the prepared paper, we operate much quicker, but it is then necessary that the object-glass be also heated to the same temperature, otherwise it would be covered with vapors which would prevent the formation of the image. When operating in the sun, this bed of vapor is formed very frequently; it is always necessary, therefore, to have the object-glass heated a little, care being taken to examine it and wipe it off in case of necessity. We also obviate this inconvenience by putting a white handkerchief over the camera, when the sun strikes it; the rays are thus reflected and do not heat the apparatus.

The exposition to the luminous radiation being finished, the image is scarcely visible, and is not developed except by the following operation, which may be made an hour or two after, with the wet paper, and even one or two days after, with the waxed paper used in the dry state.

FOURTH OPERATION.

Development of the Image.

§ 16. The image is developed with the aid of gallic acid dissolved in distilled water. The proportion which I find the best is the following:—

Distilled water	1 litre
Gallic Acid	4 grammes.

The saturated solution of gallic acid, which has been recommended formerly, has the very serious disadvantage of leaving colored crystals in the paper of the proof by effecting evaporation of the liquid during the time in which the proof remains in the bath (§49).

Pour off this solution upon a perfectly horizontal slab of glass to the thickness of nearly three or four millimetres. Immerse the proof completely, so that both sides

may be entirely covered. Watch its development, which is easily observed through the back of the paper; it must be left thus from ten minutes to one or two hours, and sometimes longer, until it is perfected.

With the waxed paper we may leave it one or two days with impunity, when we make the exposition very short—five or six seconds, for example. We singularly accelerate the development of the image, by adding several drops of aceto-nitrate of silver (15 to 20), when the image commences to develop itself; we thus obtain very intense blacks, but it is necessary then to watch its action, because it is quite rapid and gives the blacks such vigor that we run a risk of having them too powerful, if we go beyond the time.

When it is rendered very vigorous, remove it quickly to another clean slab, and wash it well in several waters, occasionally turning it and gently passing the finger over the back; by this means you remove any crystals of gallic acid which might spot the picture. We need not be troubled by the grey tint which the waxed paper acquires while it remains in the gallic acid; this tint disappears, and we are astonished at the beauty of the whites and blacks.

The tone which the image acquires upon the gallic acid will enable you to judge whether it has been exposed in the camera the proper time.

If it immediately becomes dark gray all over—properly examined by holding it up to the light—it has been exposed too long; if the strongest lights in the object, which should be very black in the negative, are not deeper than the demi-tints, it has been too long exposed; if, on the contrary, it has been exposed too short a time, the lights are but feebly marked in black.

If the time has been just right, you will obtain a superb proof, which will present the contrasts of black and white well defined, and very transparent. The first proof will serve to regulate the necessary time for exposing the remainder in the camera. I accelerate this operation much by heating the gallic acid. For that purpose I use the following apparatus:—it is composed of a square copper vessel, filled with water, which is maintained at the temperature of thirty or forty degrees. Upon the surface of this vessel I place my

slab, and thus the temperature is well equalized.

The image thus obtained would not be permanent; it must be quickly fixed by the following operation, after having first washed it with water.

FIFTH OPERATION.

Fixing the Negative Proof.

§ 17. Make in a bottle the following solution:—

Filtered water	800 grammes
Hypsulphite of soda	100 “

Cover the bottom of a dish with this (half a centimetre in depth), and plunge in your negative proof, taking care to avoid air bubbles; this dissolves the cyano-fluoriodide of silver of the proof, which remains free, but does not attack the gallo-nitrate of silver, which forms the blacks.

Never put more than one proof at a time in the bath, but you may use it for several proofs one after the other. We receive into a second bottle the hypsulphite which has already been used, and let it remain some time; flakes are formed of the gallate and sulphate of silver. We then filter, and it becomes excellent for fixing feeble proofs.

If you examine the proof as a transparency after it has remained some time in the hypsulphite bath, you may be induced to think it spoiled, as in some places spots will appear from the iodide not being completely taken away; but if you wait until it is removed, which you will know by the disappearance of the yellow tint, you will be astonished at the whiteness and transparency of the paper, as well as at the beauty of the blacks in the image. The common papers will require for this to remain in the bath from half to three quarters of an hour. If it is suffered to remain in too long the blacks of the proof would be weakened; it will be well therefore to watch this operation attentively. With waxed papers, from ten to fifteen minutes are sufficient for this fixation.

Wash the proof afterwards in several waters, and in order to free it from its hypsulphite, leave it in a large basin of clear water for nearly half an hour; then let it dry spontaneously, by hanging it up.

The proof thus fixed is completely unalterable by light, as there remains nothing more in the paper than the gallo-nitrate of silver, which is black (see §74).

I have negatives thus prepared which have already given me from two hundred to three hundred proofs, the last being as good as the first. The fixing by means of the bromide of potassium, on the contrary, is not so durable, because it does not remove any of the materials used in the preparation of the paper, but it gives with the nitrate of silver a good proof in the camera, though less sensitive (see §60).

It may, nevertheless, be of great use in traveling, and when it is required to make several proofs one after the other; because then you avoid touching the hypsulphite in preparing the negative paper, which spots at the least contact with it.

You may first place all your negative proofs together in the following bath of bromide of potassium, and then fix them immediately with the hypsulphite when all your proofs are finished; or what succeeds perfectly, dry them well with blotting paper, and not fix them until your return from your journey. It is not necessary to wax them in drawing the counter-proofs before the final fixation with hypsulphite, nor to renew the wax by the fire with the dry waxed paper.

Water	1 litre
Bromide of potass.	24 grammes.

Upon taking the proof from this bath, you must wash it in several waters and dry it. It must be left in this bath nearly fifteen minutes, but if you leave it in two or three hours, it will not injure it.

SIXTH OPERATION.

Waxing the Negative Proof.

§ 18. When the negative proof is weak, and the paper very transparent, make the positive proof without waxing it.

The proofs obtained on paper previously waxed should not be fresh; only we bring them near the fire in order to give to the wax its transparency, which has been removed from it by successive baths. Before this operation they have a grained appearance which need give us no uneasiness, since it disappears by this means, as I have already remarked. When the negative or *cliche* is vigorous and fine and has not been made upon the waxed paper, you must embue it with virgin wax, which doubles the transparency and strength of the paper, and preserves it at the same time, from the influence of the nitrate of silver which may

remain free at the surface of the positive paper.

The operation is performed as follows :—Take a large daguerreotype plate, and place it, the silver side uppermost, horizontally upon a tripod stand ; then heat it by moving a spirit lamp underneath, and with the other hand, at the same time, rub upon it a piece of virgin wax, which will melt.

When you have a good coat, well melted, put the back of your *cliche* upon it, and facilitate the perfect adherence by the aid of a card.

When it is equally imbibed, take it off and place it between several sheets of common white paper over which you pass an iron moderately hot, to take off the excess of wax. The degree of heat of the iron is sufficient if spittle simmers upon it without being movable or capable of detachment. Were it hotter than this, it will spot the proof and give much trouble to take it out, even by waxing it afresh.

SEVENTH OPERATION.

Preparation of the positive paper.

Make first a saturated solution of chloride of sodium, (common salt), or, better still muriate of ammonia (see § 69).

Take one part in volume of this solution a small glassful, for example, and add to it three parts of filtered water.

Put a small quantity of this solution (4 or 5 millimetres thick) in a dish ; then make another bottle, containing :

§ 20.—Distilled water 100 grammes.
Crystallizable nitrate of silver 20 “

Pour the same quantity of this in another dish. Have stout white paper, 15 kil. g. per ream in thickness, which you first cut the proper size, and free from spots of iron and other impurities. Choose the rough side and mark it with a x. You will easily recognize it ; it is the side which bears upon the metallic canvas serving for its manufacture, and where the woof is printed. The best paper for this operation is that of Canson Bro's. The English paper is not so good and ought not to be used except when you wish to obtain red tints.

First, place the paper upon the bath of chloride of sodium, or muriate of ammonia using the method recommended in the second operation (§ 12) and leave it from 2 to 4 minutes ; then dry it between seven

leaves of pink blotting paper, by rubbing with the hand.

Prepare in this manner three sheets before commencing to put them on the bath of nitrate of silver, so that all trace of moisture may be well removed.

Take then the first sheet prepared, and with a badger brush somewhat stiff, rub the salt side in order to remove all impurities which might adhere to it.

I prefer pink blotting paper to white, because it permits me to see and remove parts which are detached.

Then put the prepared side of this sheet upon the nitrate of silver, and leave it while you prepare another sheet on the bath of salt or muriate of ammonia.

If you leave the sheet for a short time upon the nitrate, you obtain for your picture a reddish tint ; if, on the contrary, you leave it a long time, you obtain a blacked tint.

This preparation should be made in the dark, or by the light of a candle only. You must take care that the positive paper is very dry before you put the *cliche* upon it, or it will spoil by spotting with the nitrate of silver next day. If used immediately, dry it well with the aid of a spirit lamp. You must not prepare the paper more than eight days in advance, as time will blacken it, even in the dark.

EIGHTH OPERATION.

Drawing the positive proof.

§ 21.—Place your negative picture on the lower glass of the pressure frame, and put upon it a sheet of the positive paper—the prepared side upon the negative ; then place above that, a sheet of black paper, and upon this paper, the second glass of the frame. Shut down the cover, which exercises a slight pressure on the glasses, and insures a perfect contact. I always take the precaution to place a sheet of paper, very transparent, and waxed, or glazed, between the negative proof and the sheet of positive paper ; this does not interfere with the clearness of the proof, and preserves the negative from being spotted by contact with the nitrate of silver. Moreover, I always take care to have a border outside of the frame, both of the negative and the positive paper, that I may judge of the action of the light.

Expose the frame to the light of the sun in such a way as that the rays will fall perpendicularly upon the proof. You will judge of the progress by the border outside of the frame. These are the different tints it will successively take:—greyish blue, neutral tint, dark blue, black, bister black, bister, sepia, yellowish sepia, yellowish red, greenish grey, always more and more powerful until the oxide of silver is finally reduced to the metallic state.

You must stop the process at one of these tints according to the vigor of the negative and the intensity which you wish to ensure to the positive. A proof once obtained with a negative, you may be sure, by stopping at the same tint again on the border, to obtain the same result. To have the proof of a black tint, for example, after fixation with the hyposulphite, you must stop the process at the sepia color, and the parts which should form the whites, at the greyish blue, by withdrawing it from under the frame, in order to repair the loss of color it sustains by submitting it to the hyposulphite bath.

You thus perceive that I cannot fix the precise time for exposure to light, as it depends upon the intensity of the negative, and the color of the proof which you wish to obtain.

NINTH AND LAST OPERATION.

Fixing the positive proof.

§ 22.—The positive proof thus obtained, is not permanent. You must immediately fix it by the following operation:—Dissolve in a bottle, hyposulphite of

soda	-	-	100 grammes
Filtered water	-	-	600 “

In another bottle dissolve five grammes of nitrate of silver in a glass or two of water. When well dissolved, you add to it a saturated solution of common salt, until the white precipitate ceases to fall. Allow it to repose a short time, for all the precipitate to settle; then decant the liquid, and gather the precipitate of chloride of silver, which you dissolve in the other bottle of hyposulphite of soda; by this means you obtain in order the black tones with the hyposulphite, thus prepared.

The older the hyposulphite is, the better. When it gets thick, you must add a fresh solution of hyposulphite alone, without the chloride of silver; the old containing

an excess, which it has taken from the proofs already immersed in it. Do not filter it to take away the dark deposit which is formed, but simply leave it to settle in a large bottle, and decant the clear liquid for use, in order not to spoil the black sediment, and to re-dissolve it with fresh hyposulphite.

By leaving the proof a longer or shorter period in this bath, you can obtain all the tints, from red to black, and clear yellow. With a little practice you will be sure to get any tint you desire. You must not leave a proof less than an hour, for it to be sufficiently fixed, and it can remain three or four days to obtain the sepia and yellow.

By heating the hyposulphite I accelerate the operation, but the proof must not be left an instant to itself, as the rapidity of action is so great, that the picture might be completely effaced. In this case, it is well to add to the hyposulphite a little acetic acid so as to preserve the whites.

By adding to the preceding hyposulphite solution 25 grammes of liquid ammonia, I obtain very pretty bister tints, and very pure whites. The English paper is exceedingly good for these tints.

I obtain also fine velvet-like tones by putting it (when taken out of the hyposulphite) upon a bath of the salt of gold, using one gramme of the salt to one litre of distilled water and adding to it 5 gr. of nitromuriatic acid.

Fine yellow tints are obtained by placing the proof if too vigorous, first in a bath of hyposulphite, and then in a bath composed of one litre of water and 50 grammes of muriatic acid, washing it perfectly in water.

Liquid ammonia employed in the same quantity, without previously putting the proof in the hyposulphite of soda, gives likewise remarkable tints.

When the proof is of the color you desire, wash it in several waters, and leave it two or three hours in a basin of water, until you can perceive no sweet taste which indicates the presence of hyposulphite of silver, then dry it by hanging it up, and it is finished.

The hyposulphite bath may contain as many proofs as you please, only, you must be extremely careful not to let air bubbles get between the sheets, which would produce indelible spots. I am in the habit

of brushing the proofs with a camel's hair pencil, by which means I remove the deposits which are formed upon them. The drawing of the positive proofs demands all the attention of an able operator, and it must not be regarded as of secondary importance. It is necessary to compare well the shade of a proof with the subject and the effect which we wish to produce.

PART SECOND.

Preparations of negatives upon glass by Albumen.

These preparations are based upon the property which the albumen has, by the application of heat to become completely insoluble. It is to M. Niepce de St. Victor that we owe the application of this substance to Photography upon glass. It was he who first continued in another manner, the experiments on glass made by his uncle, and arrived at the satisfactory results. It is to his incessant efforts, and the frankness with which he published his discoveries that we owe the fine proofs obtained in the present day.

The negative proofs upon glass are remarkable for a fineness approaching very near to those obtained upon metallic plates.

For the reproduction of engravings, pictures, sculpture, and landscape, the result is complete. What is still to be desired, however, for portraits, is an increase in the celerity of the operation.

It is, nevertheless, to be hoped that, with the united concurrence of artists and amateurs who are at present occupied on this subject, we shall succeed in diminishing the time necessary for exposure to light.

It is desirable that every one should publish frankly the fruit of his efforts. By this means, immense progress and improvement will evidently result.

PREPARATION OF THE ALBUMEN FOR THE GLASS.

Take the white of 10 eggs; put it into a large dish, and dissolve:—

Iodide of potassium	4 gram.
Bromide of ammonia	0 " 50 centig.
Chloride of sodium	0 " 50 "

Beat this mixture with a wooden fork, until it is reduced to a thick white froth. Then let it remain all night and the next

day decant the viscous liquid, which has settled, and use it for the preparation of your glasses.

For this purpose take thin glass, or, what is much better, ground glass, on which the adherence is more perfect. Cut it the size of your camera-frame, and grind the edges.

The success of the proof is due, in a great measure, to the evenness of the albumenized coat and the property of the glass.

To obtain this, place one of your glasses horizontally upon a level table. You can ascertain if it is perfectly horizontal with the aid of a small water level. Then pour on it an abundant quantity of albumen.

Take hold of the glass with both hands and incline it slightly in every direction so that the albumen may spread well all over the surface; then incline it by one corner, and you pour off the liquid in such a manner, that nothing more remains except an infinitely fine coating. Finally, dry the borders with tissue paper and lay the glass upon the horizontal support, allowing it to dry and keeping it screened from dust by hanging over it a pasteboard box.

At the moment of submitting it to the aceto nitrate of silver, which is the same as that described for the second operation with negative paper, at § 11, or better still, that of § 82, you expose your glass before a moderate fire, in such a manner as to remove all trace of moisture.

The application of the bath of nitrate of silver is a very delicate operation, for the least delay occasions breaches of continuity in the sensitive coating, and flaws which it is impossible to remedy.

To obtain the immersion instantaneous and regular, I make use of the following apparatus:—It is composed of two glasses between the edges of which are glued two strips of glass two centimetres in width, and one, between these two, a centimetre and a half wide, arranged so as to produce a groove at the middle, in which the glasses slide to be prepared. The best cement for this purpose, is composed of two parts of albumen and one of white cheese, to which we add lime until we obtain the proper consistence. When the cement is dry, we fill the capsule with vinegar which congeals the albumen and renders the gluing perfect.

This apparatus has in reality the form of a box for daguerreotype plates, only it has but one groove.

Fill this box about two-thirds with aceto-nitrate of silver (§11 and 82), and let the albumenized glass fall into the groove with a single movement, taking good care that it receives no check to its passage.

After leaving it to soak two or three minutes in the bath, remove it and wash it thoroughly with distilled water; then leave it in perfect darkness. Glasses thus prepared can be kept one or two days before being exposed in the camera. You develop the image after withdrawing it from the camera, in the same manner as for negatives on paper by putting it in a hot bath of gallic acid, containing not more than a tenth part in volume of aceto-nitrate of silver. It must remain in one or two hours, or more, to develop the image perfectly.

When it is well *brought out*, fix it by the same processes indicated previously for the paper at §17.

To obtain a positive proof, it is sufficient to apply on the negative a sheet of common positive paper, or better still, a sheet of positive albumenized paper which I shall describe hereafter. Put the whole into the pressure frame, placing above it a piece of very fine black cloth pasted on one side of a thick sheet of glass; then shut the frame, giving to the proof a slight pressure, being careful not to crack the proof; after which expose it to the light.

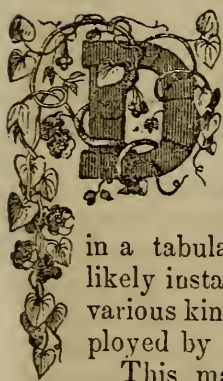
In order to follow its action, raise it by one corner of the glass, to judge of the tint which the image takes.

When you think it sufficiently exposed, take it out of the frame and fix it the same as the positive paper.

TO BE CONTINUED.

BINOCULAR PERSPECTIVE.

ATHENÆUM CLUB, PALL MALL,
25th May, 1852.



DEAR PROFESSOR WHEATSTONE.—Since I last had the pleasure of addressing you on Binocular Perspective,* it has occurred to me, as a useful step towards practice, to collect together in a tabular form, some of the most likely instances of duplication for the various kinds and sizes of pictures employed by artists.

This may therefore be regarded as supplementary to the former letter.

All the varieties of a picture, in respect to size and distance, may be comprised, I think, in four divisions:—

I.—Still life, fruit, flowers, &c., at the distance, say, of two feet from the eyes.

II.—Portrait, including the head and shoulders, (called by professional men the

three-quarter size), say, at the distance of six feet from the eyes.

III.—Whole-length portrait, and moderate sized history; with the distance of fifteen feet from the eyes.

IV.—Landscape; with the supposed distance of fifty yards or one hundred and fifty feet from the eyes; reduced afterwards monocularly to a miniature six feet off.

All of these are understood to be constructed, in the first instance, of the full scale of life or nature. On that scale the binocular allowance or duplication for false adjustment is made; after which, in any of these four instances, the picture by a simple monocular operation, may be reduced to a miniature; and in the last instance, or landscape, this reduction to a miniature is indispensable, and the full scale can only be used for the purpose of calculating the duplications.

In all the varieties, C of the first diagram in my former letter is understood to be a point duplicated by being *beyond* the plane of distinct and single vision; and C of the

* See *Art Journal* for March, 1852, pp. 89, 90.

second diagram, to be a point duplicated by being on the hithermost side of the said plane, or too near for distinct and single vision.

Before introducing the table for tenths of duplication in the different sorts and sizes of pictures, I would call attention to the following statement, applicable more especially to the fourth class, or Landscape.

At twenty-five yards, or half-way to fifty yards, the duplication of C is equal to 25 tenths of an inch, measured, at the great picture; twenty-five tenths are equal to fifty twentieths; fifty twentieths for fifty yards are monocularly diminished to one twentieth for one yard, which is equal to two twentieths or *one tenth of two yards*—the distance of our miniature picture.

N.B.—A short-hand way in practice from nature, to supersede these calculations, when their principle is once thoroughly understood, would be to *use each eye separately*; care being taken that reference is always made to the fixed vertical plane at the distance chosen.

Most of the following results have been obtained rudely and approximately with string and silk threads, by actual trial at home and out of doors; and have been since corrected, (I believe with mathematical precision,) by a friend.*

In an acknowledged article in the last number of the *North British Review*,† Sir David Brewster has noticed my former letter on Binocular Perspective, and has given some extracts from it. Unfortunately the Reviewer has entirely mistaken, in its most essential particular, the theory propounded. I was at great pains to explain that the adjustment of the spectator's two eyes is to a given vertical *plane*, to *any point of which plane the two eyes may range*, whether to the right and left, or up or down; whereas, Sir D. Brewster argues as if I supposed the two eyes fixedly adjusted to a *single point*, without any such range.

If our work were on a vertical cylinder, like a Panorama, it would be different; the range would then be for a given vertical cylinder of distinct and single vision; if on a dome, like Correggio's at Parma, the range would be for a given dome or

hemisphere. Sir David Brewster's reason of dissent from my suggestions as to the true Theory of a Picture, are thus and therefore wholly inapplicable.

But this is of the less consequence because Sir David proceeds to state his own theory of a picture, with which I am persuaded no artist *but a Pre-Raphaelite* will ever be found for one moment to agree. He would adjust the two eyes afresh to every different distance in succession, and "delineate every part of the picture with the same distinctness with which he sees it, whether in the foreground, or middle ground, or distance;" that is to say, in whatever plane the objects represented are situated. This seems to speak for itself.

I may make this an opportunity of mentioning though upon a different part of the topic—that the vanishing point of a line inclined at any angle to the Picture might be obtained, with reference to binocular considerations by drawing lines from each eye, parallel to the given line till they meet the Picture one visual base apart, and then bisecting that visual base; and I believe that the points to the right and left, horizontally 1-25 inch from the said vanishing point, would indicate the maximum of duplication for any line beyond the Picture; while the spread of the duplication for a line on the hithermost side of the Picture, from the said vanishing point, would be at the rate of C ; in proportion to distance of C from the picture: the two points mentioned to the right and left of the vanishing point would also indicate the spread for C at the distance half way between the Picture and the Spectator.

This is a new and difficult part of the topic, and requires further experiment and research; but, I *think* the leading fact is certain. Suppose a line not parallel to the Picture to be drawn through the picture at any given angle, the spectator's two eyes can be adjusted only to one point of that line, so as to see it single, namely, where it intersects the Picture. Beyond and on the hithermost side, the line will appear like two lines crossing each other at the picture, and expanding at the rate indicated for the given points, C and C , in the above Table.

To use the Table, let us take for an instance 5 inch or half an inch duplication: run the eye along to the right at that level

* See Table on next page.

† No. 33, May 1852, pp. 202.

CASE I.										CASE II.										CASE III.										(Miniature 6 Feet off.)										CASE IV.—Landscape 50 Yards, or 150 Feet off.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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in the Table ; and we find 6 inches as the distance of *C* from a Picture two feet off to give the duplication of half an inch ; and 4 inches as the distance of *C* to give half an inch. We next find, that, in Class II, or with Picture six feet off, 18 inches are required to give *C* a duplication of half an inch ; and 12 inches to give *C* a duplication of half an inch. So in Class III., or 15 feet Picture, 3 feet 9 inches are required for half an inch from the duplication of *C*, and 2 feet, 6 inches for half an inch from *C*.

Finally, the proper business of a Painter is to use both his eyes and make them bear upon his work : and I must protest urgently against the preference which both you and Sir David Brewster, as well as other high authorities, seem to give to the perfection of Monocular above Binocular vision. I am persuaded that our two eyes and their laws were given us by the Author of our nature for wise and important purposes ; and that the design has been carried out with the most admirable precision. I entirely deny that the "regulated indistinctness" produced by false adjustment of our two eyes is any imperfection ; it is an exquisite and refined arrangement ; without reference to painting, it is well known to be one of the chief means by which men distinguish near distances ; and, with reference to Painting, I believe it to be the Master-key to subordination and relief or roundness.

I have often fancied that a *miniature* was seen to greater advantage with one eye than with two : but not a genuine picture of life size : and it is to be recollected that every Landscape is necessarily a miniature. May not this advantage arise, therefore, from the second or Monocular part of the process above adverted to ?

I remain, dear Professor Wheatstone,

Yours most sincerely,

JAMES HALL.

22nd June.

P.S.—In my letter to you which appeared in the *Art-Journal* of last March, as well as in this letter, I address you as one who has attended more than others to a subject cognate with, though essentially different from, my own, and as one whose beautiful discovery of the Stereoscope

brought the whole topic of binocular vision prominently before the public.

The application of the known phenomena of binocular vision to perspective and the theory of a picture, properly so called, is a topic essentially different from yours. I suspect you do not agree with me. I am afraid you do not thoroughly understand me ; and am almost certain nobody else does.

It was not until after I had sent my second letter to you that I perceived quite clearly the law which completes and clinches the new and, I am now persuaded, true theory of a picture and of binocular perspective. I am anxious to lose no time in the announcement of what I may be excused for believing of considerable importance to the Fine Arts.

The law is, that every line not parallel to the picture has *two* vanishing points and one "intersection," and that the "indefinite representation" of such a line is found by drawing a line from the "intersection" to each of the vanishing points. The two vanishing points for the purpose of duplication, are found by drawing a line through each of the spectator's eyes parallel to the original line, till they meet the picture one visual base apart, measured horizontally on the picture, full-sized ; in other words, half a visual base to the left and right of any vanishing point obtained in the old monocular way. And the continuation of a line on the hithermost side of the picture is projected upon the picture by two lines diverging from the point of its "intersection," at the rate indicated in Diagram 2 of my letter of March last for the point, *C* and by the Table for *C* in my second letter.

In like manner every plane not parallel to the picture has two vanishing lines, except the horizontal plane—one produced by a "parallel" plane through each eye. The horizontal plane is excepted because our two eyes are situated horizontally with regard to each other, and, therefore, in that case "a parallel plane" through each eye is one and the same thing as a parallel plane through both eyes.

I will not say that there are two centres of the picture in binocular perspective, but I venture to assert that when we use both our eyes there are too vanishing points for

every line perpendicular to the picture, the centre of the picture being the point where the optic axes concur, half-way between these two vanishing points. J. H.

NEW PROCESS FOR FIXING THE IMAGE ON THE PLATE.



IN the operation of fixing with the chloride of gold the plate receives a metallic varnish which appears to be an alloy of gold and silver. The very thin film of gold gives a glassy appearance to the silver wherever it is exposed, which increases the polish of the dark parts; the matted compound which forms the light parts of the proof likewise acquires a greater mirrorage in each infinitely small facet that composes its tissue. There herefore results a brighter matting and a greater adherence of this compound on account of the superposition of the metallic varnish.

I have tried but without success to substitute platinum for gold; it has not been so with silver. Certain argentine liquids under the influence of the battery, fix the proofs very firmly; the light parts take a wonderful brilliancy, and were it not for the extreme tendency to crystalize and to form a matted deposit, which is natural to silver, it would be the best process to follow; but this crystalization of the deposit is injurious to the polish of the shades, and covers them with a blue veil as soon as it is formed. The light parts, on the contrary, are never obscure and blue, as happens with the chloride of gold, on the parts that are solarized. In such a case we obtain a fine milk-white which gives an extraordinary finish to the light parts, and this is the reason that fixing by a solution of silver is valuable for solarized pictures, which otherwise must be thrown aside.

To fix the picture by a solution of silver the best plan would be to dip the plate in a glass trough filled with a solution of chloride of silver in cyanide of potassium; but this mode renders necessary the varnishing

of the reverse side of the plate and the employment of a sheet of silver, facing the other, in the same bath, and communicating metallically with the carbon pile of a cell of Bunsen, without reckoning a number of other precautions for dipping the plate and determining the moment to stop. This process being only advantageous for solarized proofs, we must have recourse to a method still simpler which does not require the employment of a trough, of varnishing, or the sheet of silver. It consists in pouring on the plate, washed with the hyposulphite of soda and rinsed without drying, a small quantity of the silver solution, exactly in the same manner as if it was to be fixed with the chloride of gold. Before applying the electric current it is necessary to cause a mixture of the silver solution with the water remaining on the plate, by blowing on the surface with some sort of a pipe. When that is done, place on the surface of the liquid a sheet of silver leaf like that used for silvering, and the wire of the zinc pole of a cell of Bunsen having been attached to the rest, the silvering of the plate will begin as soon as the sheet of silver leaf is touched with a very fine silver wire proceeding from the carbon poles. If the current passes along well, it will be perceived by the very rapid disappearance of the silver leaf that it is incessantly displaced during the operation, and if, after its entire disappearance, the silvering is not considered thick enough, a fresh leaf can be applied. It must be well understood that this silver leaf should not touch the plate at all; otherwise, the current would pass on without having any effect upon it.

When the plates have been fixed in this manner, a new proof may be taken, after a slight buffing; but if this latter operation rubs off the film of the silver, it must be

prepared in the usual manner, to get rid of the picture confined between the two coatings of silver.

It would be possible to render the silver less crystalizable, and capable of giving a lustre to the shades, like gold, without producing a matted appearance in those parts by adding to the solution other metals, such as platinum, copper, or even gold. I have made some experiments with copper; the result has been otherwise: pure silver gives a better polish than silver alloyed with copper.

At the time when I was employed about this process I presented to the Academy of Sciences a proof very much solarized, the half of which was fixed with the chloride of gold and the other half with the silver solution. That part fixed with the chloride of gold was dark and without distinct outline, while that fixed with the silver solution was of a milk-white color, and the outlines sharply defined.

Proofs merely fixed with the chloride of gold have always a mirror-like appearance, that is to say, are only visible by reflection. This is a great imperfection. Ten years ago, whilst trying the employment of the chloride of copper, I succeeded by using it mixed with bromine water in obtaining a proof free from mirrorage, the light parts of which had the firmness and appearance of ivory. The proof fixed by this means was not photogenic, for several years after, I found a piece of it that had been constantly exposed to the light without being changed. I will now briefly explain the process by means of acids, which has sometimes succeeded very well with me for views, and which might be of service in proof intended for the stereoscope.

The inequality of chemical composition that exists in a daguerreotype between the lights and shades, certainly contains the germ of many processes for fixing without mirrorage; in the shades there is pure silver, and in the lights a deposit of a double salt of silver and mercury with a base of iodine, chlorine, or bromine. The difficulty is to darken the silver and yet to leave perfectly untouched the most fugitive lineaments of the deposit. The most energetic agents, against all expectation, transform these pictures without altering in any way their finish: but what is required is, to be able to apply them instantaneously

over the whole surface of the plate and to stop with no less precision their corrosive action. The chloride of copper is of this kind. To regulate at will the action, I have thought of making use of chlorides inert by themselves on silver, and of assisting them by the addition of nitric acid rendered active by heat.

Nitric acid alone with the aid of heat, dissolves the silver without injuring the deposit that forms the image. By this means there is formed a fine engraving, visible to the eye, although insensible to the most delicate touching. When the nitric acid is united to an alkaline chloride there is a moment when the silver, already corroded by the acid, is covered with a deep brown deposit composed of chloride of silver in a particular state. There is thus formed a dark, heavy-looking surface, which is of a perfect adherence, and possesses considerable cohesion, and there is therefore produced a proof without mirrorage, and more firmly fixed than ever; but these proofs have the great defect of darkening in the light. In this deplorable transformation it is the light parts which darken; there is formed on their surface a grey deposit that invariably becomes dark in the light. The dark coating of chloride of silver undergoes a contrary changing of color; its black tone changes more and more to a red.

I thought for a long time that I could succeed in remedying this serious inconvenience; I tried every description of agents—acids, alkalies, metalline, &c. &c., without success; it is only galvanizing the daguerreotype with an acid solution that can protect it from the light. To prepare a solution for fixing, mix together 3 parts of chloride of calcium, in a concentrated solution, with seven parts of very strong nitric acid, adding a few drops of sulphate of iron, dissolved, or a very small piece of green copperas. This addition appears to furnish finer shades. For use, this solution should be diluted in ten times its volume of water.

Instead of the hyposulphite of soda, use for washing the plate the white cyanide of potassium—from 1 to 5 grammes, in a quart of common filtered water. For this purpose, the plate having been placed level on the rest, with its corners twisted up to form a cup, the solution of cyanide of potassium is poured abundantly over it, and

allowed to run from one end of the plate to the other. As soon as the plate appears white, a large quantity of water is poured over the surface, to get rid of the cyanide of potassium; the superabundance of water being likewise got rid of by inclining the plate a little downward. The diluted fixing solution is then poured on in the same manner as in fixing with the chloride of gold; then, before applying heat, the mixture of water and the fixing solution is equalized by blowing over the surface with a pipe. As soon as this is done, begin warming underneath with a lamp furnished with a large wick, looking at the proof by the reflection of a white body—the reverse condition to that observed in fixing with the chloride of gold. If bubbles appear they must be driven away by striking the rest with a piece of metal. By continuing to warm the image, which at first appeared negative, it will by degrees become positive, from the reflection of the white, and soon assume an extraordinary relief. It will then be a chemical engraving, and the lamp must be taken away to allow the temperature to equalize.

On again applying the lamp the matting will soon be seen to appear on some part of the plate. That is the spot that should be preferably heated, to bring on in quick succession the deposit. When all the plate is covered, heat the solution to ebullition, so as to cover entirely with a thick coating the fine light parts which refuse it. The heat should be continued until no more brilliancy is perceived on the reflection of the white; the proof will then be fixed without mirroring. The defects inherent in this process are, having almost always some spots—caused by the first action of the fixed solution, the corrosion of the half tints, and particularly its furnishing images

susceptible to the light. The two former defects render this process difficult of application to portraits, but for views of small dimensions, made with very small apertures for the admission of the light, they are of no moment. I have obtained views of Notre Dame of an extraordinary delicacy, and if it were not for the general darkening in the light, they could be employed by jewelers for ornamenting caskets. I have only succeeded in protecting the daguerreotypes from the influence of the light by galvanizing with the acid ammoniacal nitrate of silver.

The plate having been placed on the rest, and first of all, washed plentifully in water after its fixation without mirroring, there will be seen on its surface some acid nitrate of silver, which is to be equalized with the pipe. To determine the silver deposit, a strip of silver, fitted to the wire of the carbon pole, is moved to and fro, in the liquid. By this means the light parts are covered with a crystal deposit of silver as white as paper. During this time, the eye must be kept on the shades, and the strip of silver taken out as soon as it is perceived that crystals of silver are deposited about it.

The argentine ammonio-nitrate of silver is prepared by dissolving one part of nitrate of silver in twenty parts of distilled water, by afterwards adding a few drops of ammonia, they will form a precipitate which is dissolved by adding nitric acid to excess. The action of the battery should be very feeble; it is to be charged with sulphuric acid containing 50 parts of water, and nitric acid. Great care should be taken that the metallic communications be perfect between the zinc pole and the leg of the support, on the one part, and the edges and the back of the plate, on the other.

CHEMICALS.



O the practical daguerrean, only second to sunlight, are good chemicals. The most fortunate have not always escaped the mortification and chagrin of a failure, perhaps for days together, solely from the use of some one poor article; and not least among his torments is the difficulty of determining *which* among the catalogue is in default. Some impurity in the rouge may so effect the plate, that the best sensitive, subject, light and gilding, will not produce a good picture; yet the *sensitive* is suspected, and a good battery is thrown aside for one whose character is well established. Still it works no better. Next the lense is overhauled and cleaned—a new bottle of gilding tried—till last of all, the lurking place of the enemy is discovered in the rouge bottle. Defect in any other substance might involve the same vexatious and expensive search; causing delay in good weather, engendering distrust of the artist's skill in the public mind, and an unavoidable loss of much good custom.

Other defects in the chemicals, perhaps not as disastrous to picture making, yet not a little vexatious to the operator, are their dilution and adulteration.

For instance, the article generally sold under the title of *Chloride of Gold*—more properly *salt* stained with a solution of the chloride. This mode of adulteration doubtless had its origin in the want of skill on the part of those who by the manufacture, would speculate out of the profession. The uninitiated not being able to crystalize this salt so that it would not deliquesce, the strategem of mixing with it a little salt was resorted to, till at present, the operator is scarcely able to find in market pure chloride of gold. This adulteration cannot be regarded as quite harmless in the gilding process, yet the chief mischief is in destroying all standard of value, the only guide being the *color*, which is constantly varied by the length of time which it is heated, the intensity of the heat, &c. In fact the

operator never knows the value of a bottle till in his rooms he finds that a whole bottle is necessary to produce a very small quantity of gilding strong enough to bring out the effect.

The great mass of *sensitives* deserve the same comments.

To the artist the correction of these evils becomes a question of serious moment. To our own mind this question admits of but one solution, and that a very simple one. A regular establishment for the manufacture of all the materials must be got up; carried on by competent and responsible gentlemen, where a pure article may always be relied upon, and such an effort promptly encouraged and sustained by the profession generally. This we do not hesitate to say will set the matter right at once, and we are happy to be able to announce to our readers the opening of just such an establishment at Utica, by our old and tried friend, D. D. T. Davie, associated with Prof. Gurdon Evans, A. M. Mr. Evans has not been so well known to the fraternity as to the public generally, in the capacity of an analytical and practical chemist, first as a student at old Yale, and later as a careful and successful practitioner in his profession. Mr. Evans is to devote his time to the manufacturing department, and the company propose to test every thing carefully and thoroughly before it is offered for sale.

From the well known character of these gentlemen, and their rich and varied scientific and practical attainments, we most cordially congratulate the fraternity on so fortunate and important an auxiliary, and recommend the *Utica Chemical Manufacturing Co.* to the patronage of all who aim to excell in their business. Other incidental results of great importance may safely be relied on from such an establishment. In order to make improvements in any practical art, much time and expense are necessarily devoted to experimenting, which the practical artist *cannot* attend to, and the dabbling compounder *will* not, even if he possess the requisite skill, when he can make as much money

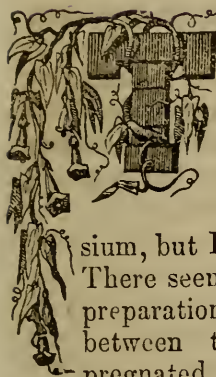
without the trouble of conducting tedious experiments as with. This new company

may rely upon our co-operation and best wishes.

THE COLLODION PROCESS IN PHOTOGRAPHY FOR THE PRODUCTION OF INSTANTANEOUS PROOFS.

BY ALPHONSE DE BREBISSE.

Translated from the French by Mrs. A. L. Snelling.



To produce the photographic collodion, it is sufficient to add some iodine. We at first employ the iodine of silver, and this combination I prefer. The English add the iodide of potassium, but I find it much less sensitive. There seems to me between these two preparations the same difference as between the negative papers impregnated with iodine of silver by a double operation, such as those of M. M. Talbot and Blanquart Evrard, and that of M. Guillet Saguez, who include only the iodide of potassium. It is possible to succeed equally in this last case but certainly more slowly.

Iodine of silver can be made to enter into the composition of collodion in many ways; in the dissolution, in the cyanuret of potassium, in the nitrate of potassium, and in a solution of iodine of potassium, and it is this last process which I have adopted, and which I proceed to describe.

If we are confined to the simple addition of iodine of potassium in the collodion, we can pour into this substance some drops of an alcoholic solution, or some addition of the iodine of potassium. But I repeat, this process gives proofs of very little sensibility. This is the way in which I prepare the solution of iodine of silver proper to form the photographic collodion.

I first make of the iodide of silver a solution of azotate of silver in a solution of iodide of potassium. The proportions of

these solutions are of very little importance, however, we can employ the following:—

Distilled water	- -	30 grains
Azotate of silver	- -	3 “

Distilled water	- -	40 grains
Iodide of potassium,	-	2 “

We pour by degrees the first solution into the second. When the iodide of silver which is formed becomes yellowish and flaky, as it condenses at the bottom of the vase, it ought to be washed in water. This precipitate is then cast into a filter of paper. When the water is drained off, we pour upon the iodide of silver a small quantity of alcohol which finishes the operation. Now take in portions, by means of a spoon bill of glass, the iodide of silver remaining upon the filter while it is yet humid, and dissolve it in an alcoholic solution saturated with iodide of potassium and agitate it quickly. When the liquid remains turbid it proves that it is well saturated; leave it then at rest until it is necessary to use it.

The alcoholic solution saturated with iodide of potassium is obtained by putting an excess of iodide of potassium well pulverized, into a flask filled with alcohol at 33°. If any thing remains of the iodide not dissolved, in the bottom of the flask, we may be certain that the alcohol is saturated and decant the superior part to dissolve the iodide of silver.

I would remark that the iodide of silver dry is very little sensible in the iodurated alcohol, it is then necessary to use it fresh in a way which I will explain.

This alcoholic solution of the iodide of silver, gives only a slight sensibility to the coating of collodion spread upon the plates, but we can increase this sensibility by adding a solution of the iodide of iron.

The iodide of solid iron which furnishes the fabric of chemical productions, has never furnished me with as good results, as I have obtained by turning twenty grammes of water upon one gramme of lime mingled with three grammes of iodine.

This combination gives place to a dark red liquid which should remain at rest.

I then decant fifteen grammes of this iodide of iron, to which I add twenty grammes of alcohol at 33°, which gives me an alcoholic solution of iodide of iron which answers very well.

If I limit myself, in this pamphlet, to speaking only of the preparations concerning collodion, I will say that the albumenized plates plunged during some minutes into this solution and dried, acquire a great sensibility, especially when they produce the image by a solution of protosulphate of iron.

The prepared collodion, as I have said

above, ought to be mixed with the iodurated solutions in this proportion :

Collodion unspread - - - 50 gram's
Alcoholic solution of iodide of

silver - - - - - 15 "

Solution id. of iodide of iron - 6 "

Agitate these substances, and leave them to rest just as the liquid becomes limpid, which demands at least twelve or fifteen hours. It is then best to decant the clearest part, and to preserve it in a flask with a large opening, which serves to extend it upon the plates.

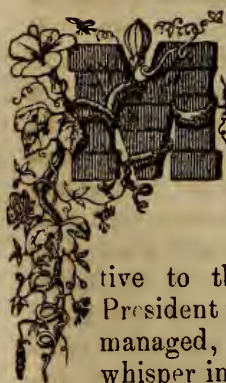
The collodion thus ready to be used ought to have a fine orange color, which slightly resembles the color of strong bromine.

This color will be simply yellow, if it does not enter into the iodide of silver to which it will attach itself, for it will already have a great vitality ; but the addition of the iodide of iron gives a very remarkable acceleration, which is not only owing to the great quantity of iodine, but to the nature of its base.

TO BE CONTINUED.

LIFE OF BENJAMIN WEST.*

BY A. CUNNINGHAM.



EANWHILE, the Incorporated Artists continued their debates, in total ignorance that their dissenting brethren were laying the foundation of a surer structure than their own.

Kirby, teacher of perspective to the King, had been chosen President: but so secretly was all managed, that he had never heard a whisper in the palace concerning the new academy, and in his inaugural address from the chair, he assured his companions that his Majesty would not countenance

schismatics. While West was one day busy with his *Regulus*, the King and Queen looking on, Kirby was announced, and his Majesty, having consulted his consort in German, admitted him, and introduced him to West, to whose person he was a stranger. He looked at the picture, praised it warmly, and congratulated the artist; then, turning to the King, said, "Your Majesty never mentioned any thing of this work to me; who made the frame? it is not made by your Majesty's workmen; it ought to have been made by the royal carver and gilder." To this impertinence the King answered, with great calmness, "Kirby, whenever you are able to paint me such a picture as this, your

* Continued from page 127, Vol. 4, No. 2.

friend shall make the frame." "I hope, Mr. West," said Kirby, "that you intend to exhibit this picture?" "It is painted for the palace," said West, "and its exhibition must depend upon his Majesty's pleasure." "Assuredly," said the King, "I shall be very happy to let the work be shown to the public." "Then Mr. West," said Kirby, "you will send it to my exhibition." "No!" interrupted his Majesty, "it must go to *my* exhibition—to that of the Royal Academy." The President of the Associated Artists bowed with much humility and retired. He did not long survive this mortification, and his death was imputed by the founders of the new academy to jealousy of their rising establishment, but by those who knew him well, to a more ordinary cause, the decay of nature. The Royal Academy was founded, and in its first exhibition appeared the *Regulus*.

A change was now to be effected in the character of British art; hitherto historical painting had appeared in a masking habit: the actions of Englishmen seemed all to have been performed, if costume were to be believed, by Greeks or by Romans. West dismissed at once this pedantry, and restored nature and propriety in his noble work of "*The Death of Wolf*." The multitude acknowledged its excellence at once. The lovers of old art, the manufacturers of compositions called by courtesy classical, complained of the barbarism of boots, and buttons, and blunderbusses, and cried out for naked warriors, with bows, bucklers, and battering rams. Lord Grosvenor, disregarding the frowns of the amateurs, and the, at best, cold approbation of the Academy, purchased this work, which, in spite of laced coats and cocked hats, is one of the best of our historical pictures. The Indian warrior, watching the dying hero, to see if he equalled in fortitude the children of the deserts, is a fine stroke of nature and poetry.

The King questioned West concerning the picture, and put him on his defence of this new heresy in art. To the curiosity of Galt we owe the sensible answer of West:—"When it was understood," said the artist, "that I intended to paint the characters as they had actually appeared on the scene, the Archbishop of York called on Reynolds, and asked his opinion;

they both came to my house to dissuade me from running so great a risk. Reynolds began a very ingenious and elegant dissertation on the state of the public taste in this country, and the danger which every innovation incurred of contempt and ridicule, and concluded by urging me earnestly to adopt the costume of antiquity as more becoming the greatness of my subject than the modern garb of European warriors. I answered, that the event to be commemorated happened in the year 1758, in a region of the world unknown to the Greeks and Romans, and at a period of time when no warriors who wore such costume existed. The subject I have to represent is a great battle fought and won, and the same truth which gives law to the historian should rule the painter. If instead of the facts of the action I introduce fictions, how shall I be understood by posterity? The classic dress is certainly picturesque, but by using it I shall lose in sentiment what I gain in external grace. I want to mark the place, the time, and the people, and to do this I must abide by truth. They went away then, and returned again when I had the painting finished. Reynolds seated himself before the picture, examined it with deep and minute attention for half an hour; then rising, said to Drummond, 'West has conquered; he has treated his subject as it ought to be treated; I retract my objections. I foresee that this picture will not only become one of the most popular, but will occasion a revolution in art.''" "I wish," said the King, "that I had known all this before, for the objection has been the means of Lord Grosvenor's getting the picture, but you shall make a copy for me."

West had now obtained the personal confidence of the King and the favor of the public; his commissions were numerous, but of course the works for the palace had precedence. His Majesty employed him to paint the death of Epaminondas, as a companion to that of Wolf, the death of the Chevalier Bayard, Cyrus liberating the family of the King of Armenia, and Segestes and his daughter brought before Germanicus. The air of the palace had some influence on the mind of the prudent Quaker. The great Leibnitz had pointed out the descendants of Segustus in our own royal line, and West communicated a little

of the lineaments of the living to the images of the dead. The good King was much pleased with the work.

It is said, that Sir Joshua Reynolds now began to observe West's favor somewhat resentfully, thinking that a ray or two of the royal sunshine might in fairness have fallen upon himself. The President was not fool enough to complain, but his friends did so for him; while West, too prudent to carry himself loftily because of his good fortune, enjoyed his success in secret, and continued in the outward man submissive and thankful. To Reynolds had fallen the whole portrait department of church and state, which lay without the gates of the palace; while within, West reigned triumphant. Thus they divided the British world of art between them, while Barry and Wilson, by toiling without distinction, were earning precarious bread.

West was not the man to remain insensible to the advantage of having a young, amiable, and patriotic sovereign for his patron. The painter expressed his regret that the Italians had dipped their pencils in the monkish miracles and incredible legends of the church, to the almost total neglect of their national history; the King instantly bethought him of the victorious reign of our third Edward, and of St. George's Hall in Windsor Castle. West had a ready hand; he sketched out the following subjects, seven of which are from real and one from fabulous history:—

1. Edward the Third embracing the Black Prince, after the battle of Cressy.
2. The Installation of the order of the Garter.
3. The Black Prince receiving the King of France and his son prisoners, at Poitiers.
4. St. George vanquishing the Dragon.
5. Queen Phillipa defeating David of Scotland, in the Battle of Neville's Cross.
6. Queen Phillipa interceding with Edward for the Burgesses of Calais.
7. King Edward forcing the passage of the Somme.
8. King Edward crowning Sir Eustace de Ribault at Calais.

These works are very large. They are the fruit of long study and much labor, and with the exception of the Death of Wolfe and the Battle of La Hogue, they are the best of all the numerous works of this artist. Their lustre is fresh and unfaded; their coloring natural and harmonious: they present a lively image of the times

and the people; but they are deficient in strength and variety of character; they seize attention, but are unable to detain it.

West, however, had the good fortune to maintain his influence at Windsor. When the King grew weary of courts, and camps, and battles, the observing artist took new ground, and appealed to the religious feelings of his royal patron. He suggested to the King a series of pictures on the progress of revealed religion: a splendid Oratory was projected for their reception; and half-a-dozen dignitaries of the church were summoned to consider the propriety of introducing paintings into a place of worship. "When I reflect," said the King, "that the Reformation condemned religious paintings in churches, and that the parliament in the unhappy days of Charles the First did the same, I am fearful of introducing any thing which my people might think popish. Will you give me your opinions on the subject?" After some deliberation Bishop Hurd delivered in the name of his brethren and himself their unanimous opinion, that the introduction of religious paintings into *his Majesty's Chapel* would in no respect whatever violate the laws or the usages of the Church of England. "We have examined too," continued Hurd, "thirty-five subjects which the painter proposed for our choice and we feel that there is not one of them but may be treated in a way that even a Quaker might contemplate with edification." The King conceived this to be an ironical allusion to West, and was a little nettled. "The Quakers," he replied, "are a body of Christians for whom I have a high respect. I love their peaceful tenets, and their benevolence to one another, and, but for the obligations of birth, I would be a Quaker." The Bishop bowed submissively and retired.

No subtle divine ever labored more diligently on controversial texts, than did our painter in evolving his pictures out of the grand and awful subject of revealed religion. He divided it into Four Dispensations—the Antedeluvian, the Patriarchal, the Mosaical, and the Prophetical. They contained in all thirty-six subjects, eighteen of which belonged to the Old Testament, the rest to the New. They were all sketched, and twenty-eight were executed, for which West received in all twenty-one

thousand seven hundred and five pounds. A work so varied, so extensive, and so noble in its nature, was never before undertaken by any painter. But the imagination of West was unable to cope with such glorious themes; the soft, the graceful, and the domestic were more suited to his talents. Several of the subjects too were necessarily the same as those painted by the great masters—the Last Supper, the Crucifixion, and the Annunciation, had been over and over again handled by artists higher in mental stature than West; and in the competition he had nothing to hope and every thing to fear. He was daring in his undertakings; not so in his genius.

During the progress of these works, he painted many pictures of lesser importance. The King, the Queen, the young Princes and Princesses sat for their portraits, sometimes singly and sometimes in groups, forming in all nine pictures, for which West received two thousand guineas—a royal price, when we consider the charges of Reynolds and Gainsborough at this time. They are well conceived and prettily drawn, but want soul and substance, and seem the shadows of what is noble and lovely. There is no deception; they are flat, and the eye seems to see through both color and canvas; but time and frail materials may be mainly blameable for this.

The war which broke out between Britain and her colonies was a sore trial to the feelings of West; his early friends and his present patrons were involved in the bloody controversy. He was not, according to his own account, silent; he was too much in the palace and alone with his Majesty to avoid some allusion to the strife; the King inquired anxiously respecting the resources of his foes and the talents of their chiefs, and the artist gave, or imagined he gave, more correct information concerning the American leaders and their objects than could be acquired through official channels. West had been long away from his native land; his literary talents were not of an order to allure correspondents, and with few, if any, of the influential insurgents can it be supposed that he was at all acquainted. But not few were the delusions under which this amiable man lived. How he contrived both to keep his place in the King's opinion, and the respect of the spi-

rits who stirred in the American revolution he has not told us, but it is not difficult to guess. He was of a nature cold and unimpassioned; his religion taught him peace, his situation whispered prudence, and the artist dismissed civil broils from his mind, and addressed himself to more profitable contemplations. He saw his reward in fortune, and perhaps in fame, for those days of toil and nights of study, in which he painted and pored over history, sacred and profane, and he closed his eyes on all else save elaborate outlines and the effect of light and shade.

He was now moving in the first circles, and the word of West was the courtly sanction in matters of taste. His various and extensive works left little leisure for the acquisition of extra-professional knowledge and he probably thought that excellence in art was enough. By dining with divines, he had learned to skim the surface of religious knowledge, and his professional and general society gave him hints as to what was passing in the world of literature and fashion. He made the little that he did know go far; and found means to pass with men of some discernment as a silent person of fair education, who did not wish to throw any wisdom away. The royal favor was much; and he had besides a certain quiet air of natural dignity in his manner.

The death of Reynolds vacated the President's chair, and no one then living was more worthy to fill it than Mr. West. Thy fierce temper of Barry left him no chance of the honor which his genius merited. To the choice of the Academy the king gave his ready sanction, and West took his place on the 24th of March, 1792, and delivered his inaugural address to an audience who much applauded a composition which could have cost him little thought, since it dwelt but on two topics—the excellence of the British art, and the gracious benevolence of his Majesty.

The new President delivered many discourses, all more or less distinguished for plain practical sense. He pressed upon the students the value of knowledge and the necessity of study, and on the uselessness of both without a corresponding aptitude of mind and buoyancy of imagination—in other words genius. He advised them to give heart and soul wholly to art, to

turn aside neither to the right nor to the left, but consider that hour lost in which a line had not been drawn nor a masterpiece studied. "Observe," he said, "with the same contemplative eye the landscape, appearance of trees, figures dispersed around, and their aerial distance as well as lineal forms. Omit not to observe the light and shade in consequence of the sun's rays being intercepted by clouds or other accidents. Let your mind be familiar with the characteristics of the ocean; mark its calm dignity when undisturbed by the winds, and all its various states between that and its terrible sublimity when agitated by the tempest. Sketch with attention its foaming and winding coasts, and that awful line which separates it from the heavens. Replenished with these stores, your imagination will then come forth as a river collected from little springs spread into might and majesty. If you aspire to excellence in your profession, you must, like the industrious bee, survey the whole face of nature and sip the sweet from every flower, when thus enriched, lay up your acquisitions for future use, and examine the great works of art to animate your feelings and to excite your emulation. When you are thus mentally enriched, and your hand practised to obey the powers of your will, you will find your pencils or your chisels as magic wands calling into view creations of your own to adorn your name and country."

In this way he labored to stimulate his youthful audience; but to awaken indifference into energy—to add wings to those whose imaginations were fit for flight, and fuel to the fire of genius, required higher powers. He had no unstudied felicities of phrase, little vigor of thought, or happiness of illustration—he was cold, sensible, and instructive; and the student, who may learn from his pictures the way to manage a difficult subject, and from his life the art of employing his time, can hardly be expected to re-read his discourses.

So regular were West's hours of labor, and so carefully did he calculate his time, that to describe one day of his life is to describe years. He rose early—studied before breakfast—began to work on one of his large pictures about ten—painted with little intermission till four—washed, dressed, and saw visitors, and

having dined, recommenced his studies anew. His works were chiefly historical; he dealt with the dead; and the solitude of his gallery was seldom invaded by the rich or the great, clamoring for their portraits. Visitors sometimes found their way to his inner study while he had the pencil in his hand; he had no wish to show off his skill to the idle, and generally sat as silent and motionless on such occasions as one of his own apostles. His words were few, his manner easy; his Quaker-like sobriety seemed little elevated by intercourse with nobles and waiting gentlewomen. On the Windsor pictures he expended much study, and to render them worthy of their place, he "trimmed," as he told the King, "his midnight lamp." So closely was he imprisoned by their composition, that his attendance at the burial of so eminent a brother as Gainsborough was mentioned as something extraordinary.

It must not be supposed that he enjoyed without envy the threefold blessing of magnificent subjects, high prices, and kingly favor. Barry was famishing, and his complaints were loud and eloquent. Fuseli, with all his wit, learning, and imagination, could barely live; and Opie had been taught the severe though common lesson, that nothing is so unstable as the patronage of the powerful. The very calmness and moderation with which the King's historical painter carried himself was something provoking. He went from his gallery in Newman-street to Windsor, and back again, with the staid looks of one of the brethren going to, and returning from chapel. Of his importance at Court, however, he was willing enough to speak, though in a mild and meek way; and as to high matters in general he affected somewhat of the vague diplomatic language of official men: West had probably no state secrets to conceal—if he had, his conversation kept them a mystery.

When he succeeded to the President's chair, the King wished to confer upon him the distinction of knighthood. To lay the royal sword on the shoulder of a Quaker was something new, and the curiosity of the courtiers was excited. The Duke of Gloucester called on West from the King to inquire if this honor would be acceptable. "No man," said Benjamin, "entertains a higher respect for political honors

and distinctions than myself, but I really think I have earned greater eminence by my pencil already than knighthood could confer on me. The chief value of titles is to preserve in families a respect for those principles by which such distinctions were originally obtained—but simple knighthood to a man who is at least as well known as he could ever hope to be from test honor, is not a legitimate object of ambition. To myself then your royal highness must perceive the title could add no dignity, and as it would perish with myself, it could add none to my family. But were I possessed of fortune, independent of my profession, sufficient to enable my posterity to maintain the rank, I think that, with my hereditary descent and the station I occupy among artists, a more permanent title might become a desirable object. As it is, however, that cannot be; and I have been thus explicit with your royal highness that no misconception may exist on the subject."

The Duke took West by the hand, and said, "You have justified the opinion which the King has of you: he will be delighted with your answer."

In that answer there was certainly very little of the Quaker. Possibly he was not without hope that the King would confer a baronetcy, and an income to support it, on one who, to descent from the lords of Delaware, could add such claims of personal importance. No farther notice, however, was taken of the matter; he went to the palace as usual, and as usual his reception was warm and friendly.

From 1769 till 1801 West had uniformly received all orders for pictures from his Majesty in person. They had settled the subject and price between them without the intervention of others, and, in addition to his one thousand pounds a year paid on account, he had received whatever more, and it was not much, might be due upon the pictures actually painted. A great change was near. A mental cloud fell upon the King, and the artist was the first to be made sensible that the sceptre was departed from his hand. The doors of the palace, which heretofore had opened spontaneously like those of Milton's Paradise, no longer flew wide at his approach, but turned on their hinges grating and reluctantly. What this might mean he was in-

formed by Mr. Wyatt, the royal architect, who called and said he was authorized to inform him that the pictures painting for the chapel at Windsor must be suspended till farther orders. "This extraordinary proceeding," says Galt, "rendered the studies of the best part of the artist's life useless, and deprived him of that honorable provision, the fruit of his talents and industry, on which he had counted for the repose of his declining years. For some time it affected him deeply, and he was at a loss what steps to take. At last, however, on reflecting on the marked friendship and favor which the King had always shown him, he addressed to his Majesty a letter, of which the following is a copy of the rough draught, being the only one preserved." After mentioning the message to suspend the paintings for the chapel, it proceeds—

"Since 1797 I have finished three pictures, begun several others, and composed the remainder of the subjects for the chapel, on the progress of Revealed Religion. Those are subjects so replete with dignity of character and expression, as demanded the historian, the commentator, and the accomplished painter to bring them into view. Your Majesty's gracious commands for my pencil on that extensive subject stimulated my humble abilities, and I commenced the work with zeal and enthusiasm. Animated by your commands, I burned my midnight lamp to attain that polish which marks my scriptural pictures. Your Majesty's zeal for religion and love of the elegant arts are known over the civilized world, and your protection of my pencil had given it celebrity, and made mankind anxiously look for the completion of the great work on Revealed Religion. In the station which I fill in the Academy I have been zealous of promoting merit; ingenious artists have received my ready aid, and my galleries and my purse have been opened to their studies and their distresses. The breath of envy or the whisper of detraction never defiled my lips, nor the want of morality my character; and your Majesty's virtues and those of her Majesty have been the theme of my admiration for many years.

"I feel with great concern the suspension of the work on Revealed Religion—if it is meant to be permanent, myself and

the fine arts have much to lament. To me it will be ruinous, and it will damp the hope of patronage in the more refined departments of painting. I have this consolation, that in thirty years during which my pencil has been honored with your commands, a great body of historical and scriptural works have been placed in the churches and palaces of the kingdom. Their professional claims may be humble, but similar works have not been executed before by any of your Majesty's subjects. And this I will assert, that your commands and patronage were not laid on a lazy or an ungrateful man, or an undutiful subject."

To this letter, written on the 26th of September, 1801, and carried to the court by Wyatt, West received no answer. On his Majesty's recovery, he sought and obtained a private audience. The King had not been made acquainted with the order for suspending the works, nor had he received the letter. "Go on with your work, West," said the King, kindly, "go on with the pictures, and I will take care of you." He shook him by the hand and dismissed him. "And this," says Galt, "was the last interview he was permitted to have with his early and constant, and truly royal, patron. But he continued to execute the pictures, and, in the usual quarterly payments, received his £1000 per annum till his Majesty's final superannuation; when without any intimation whatever, on calling to receive it, he was told that it had been stopped, and that the paintings for the chapel, of Revealed Religion, had been suspended. He submitted in silence—he neither remonstrated nor complained."

The story of his dismissal from court was spread with many aggravations; and the malevolence of enemies which his success had created—there are always such reptiles—was gratified by the circulation of papers detailing an account of the prices which the fortunate painter had received for his works from the King. The hand which had drawn up this injurious document neglected to state that the sum of thirty-four thousand one hundred and eighty-seven pounds was earned in the course of thirty-three laborious years: and the public, looking only to the sum at the bottom of the page, imagined that West

must have amassed a fortune. This notion was dispelled by an accurate statement of work done and money received, with day and date, signed with the artist's name, and accompanied by a formal declaration of its truth; a needless addition, for all who knew any thing of West, knew him to be the most honorable of men.

While suffering under the neglect of the court, the peace of Amiens opened the continent, and thither West went, to see with his own eyes the splendid works of the pencil and chisel, which Bonaparte had assembled in the Louvre. The President of the British Academy was not to be overlooked by the wily politicians who surrounded the future emperor. Minister after minister, and artist after artist, from the accomplished Talleyrand and the subtle Fouché to the enthusiastic Dénon and the ferocious David, gathered around him, and talked, with unbounded love, of historical painting and of its influence on mankind. In a series of entertainments, in which wine and flattery were poured out abundantly, the enemies of his country succeeded in persuading the simple Benjamin that they were the most philanthropic of all nations and their master the kindest and worthiest of men.

Filled with these fine notions, West one day came up to Mr. Fox and Sir Francis Baring, as they were strolling about the Louvre, and harangued them on the sublime and benevolent views of Napoleon, who only conquered kingdoms out of love for liberty, and collected pictures in the towns which he stormed, "to furnish models of study for artists of all nations." He concluded by pointing out the propriety, even in a mercantile point of view, of encouraging to a seven-fold extent the higher departments of art in England. The prospect of commercial advantages pleased Baring, and Fox said, with much frankness, and with that sincerity which lasts at least for the moment, "I have been rocked in the cradle of politics, and never before was so much struck with the advantages, even in a political bearing, of the Fine Arts, to the prosperity as well as to the renown of a kingdom; and I do assure you, Mr. West, if ever I have it in my power to influence our government to promote the Arts, the conversation which we have had to-day shall not be forgotten."

They parted, and West returned to England.

Old age was now coming on him ; but his gray hairs were denied the repose which a life of virtue and labor deserved. He took it into his head that he was looked upon coldly by the government for his admiration of Bonaparte : and, assailed in the Academy by an opposition strong in numbers and in eloquence, in which Shee distinguished himself, he was induced to retire from the President's chair, and Wyatt was elected in his stead. This distinction the court architect had merited by no works which could be weighed in the balance with the worst of his predecessor's ; and West persuaded himself that his own splendid reception in France had been at the root of all the evil. He certainly had a very lofty notion of himself, and his account of the stir which he excited in Paris marks a mind amiably but extravagantly vain. "Wherever I went," he said, "men looked at me, ministers and people of influence in the state were constantly in my company. I was one day in the Louvre—all eyes were upon me ; and I could not help observing to Charles Fox, *who happened to be walking with me*, how strong was the love of art, and admiration of its professors in France." This trait of simplicity will never be surpassed.

In a short time, however, the Academy weary of Wyatt, displaced him and restored the painter, by a vote which may be called unanimous ; since there was only one dissenting member—supposed to be Fuseli—who put in the name of Mrs. Moser for President. Ladies were at that period permitted to be members, and the jester no doubt meant to insinuate that a shrewd old woman was a fit rival for West.

The restored President now endeavored to form a national association for the encouragement of works of dignity and importance, and was cheered with the assurance of ministerial, if not, royal, patronage. But many of those who countenanced the design were cautious and timid men, deficient in that lofty enthusiasm necessary for success in grand undertakings, and whose souls were not large enough to conceive and consummate a plan worthy of the rank and genius of the nation. The times, too, were unfavorable : Englishmen had in those days need enough to think of

other matters than paintings and statues. Mr. Pitt, who had really seemed disposed to lend his aid to this new association, soon died. Mr. Fox, who succeeded him declared, "as soon as I am firmly seated in the saddle, I shall redeem the promise I made in the Louvre"—but he also was soon lost to his country. The pistol of an assassin prevented Perceval from taking into consideration a third memorial, which West had drawn up, and the President at last relinquished the project in despair.*

West was now sixty-four years old—a life blameless and temperate had kept his strength unimpaired, and he had still the same composed and determined mind by which he was distinguished in his youth. He had also unbounded confidence in his own powers, and since the illness of his royal friend had closed the doors of the palace against him, he resolved to try once more his fortune with the public. He accordingly commenced painting a series of Scriptural subjects upon a large scale : and the first which appeared was that of "Christ healing the Sick." The history of this picture deserves to be told. The Quakers of Philadelphia requested West to aid them in erecting an hospital for the sick in his native town—he told them his circumstances scarcely admitted of his being generous, but he would aid them after his own way, and paint them a picture, if they would provide a place to receive it in their new building. They were pleased with this, and "Christ healing the Sick" was painted for Philadelphia. When exhibited in London, the rush to see it was very great—the praise it obtained was high—and the British Institution offered him three thousand guineas for the work : West accepted the offer, for he was far from being rich,—but on condition that he should be allowed to make a copy, with alterations, for his native place. He did so ; and when the copy went to America, the profits arising from its exhibition enabled the committee of the hospital to enlarge the building and receive more patients.

The success of this piece impressed West with the belief that his genius appeared to most advantage in pictures of

* The British Institution was formed out of the wreck of West's magnificent plan.

large dimensions, and that royal commissions had hitherto interposed between him and fortune. His mind, from long contemplation, was familiar with subjects of gigantic proportions; and he had soon sketched out several, and finished some. But the little snug and comfortable houses of England could not contain this colossal progeny; the doors of our churches are generally opened to art with reluctance—our palaces had already admitted more of the President's works than, perhaps, were welcome; and the owners of our galleries were unwilling to make room for such enormous pieces on Scripture subjects. There was no market for the manufacture. Few were tempted to become purchasers, though many were edified with the "Descent of the Holy Ghost on Christ at the Jordan," ten feet by fourteen—"The Crucifixion," sixteen feet by twenty-eight—"The Ascension," twelve feet by eighteen—and "The Inspiration of St. Peter," of corresponding extent. As old age benumbed his faculties, and began to freeze up the well spring of original thought, the daring intrepidity of the man seemed but to grow and augment. Immense pictures, embracing topics which would have alarmed loftier spirits, came crowding thick upon his fancy, and he was the only person who appeared insensible that such were too weighty for his handling.

Domestic sorrow mingled with professional disappointment. Elizabeth Shewell—for more than fifty years his kind and tender companion—died on the 6th of December, 1817, and West, seventy nine years old, felt that he was soon to follow. His wife and he had loved each other some sixty years—had seen their children's children—and the world had no compensation to offer. He began to sink, and though still to be found at his easel, his hand had lost its early alacrity. It was evident that all this was to cease soon; that he was suffering a slow, and a general, and easy decay. The venerable old man sat in his study among his favorite pictures a breathing image of piety and contentment, awaiting calmly the hour of his dissolution. Without any fixed complaint, his mental faculties unimpaired, his cheerfulness uneclipsed, and with looks serene and benevolent, he expired 11th March, 1820, in the eighty-second year of his age. He was

buried beside Reynolds, Opie, and Barry, in St. Paul's Cathedral. The pall was borne by noblemen, ambassadors, and academicians; his two sons and grandson were chief mourners; and sixty coaches brought up the procession.

Benjamin West was in person above the middle size, of a fair complexion, and firmly and compactly built. His serene brow betokened command of temper, while his eyes, sparkling and vivacious, promised lively remarks and pointed sayings, in which he by no means abounded. Inter-course with courts and with the world, which changes so many, made no change in his sedate sobriety of sentiment and happy propriety of manner, the results of a devout domestic education. His kindness to young artists was great—his liberality seriously impaired his income—he never seemed weary of giving advice—intrusion never disturbed his temper—nor could the tediousness of the dull ever render him either impatient or peevish. Whatever he knew in art he readily imparted—he was always happy to think that art was advancing, and no mean jealousy of other men's good fortune ever invaded his repose. His vanity was amusing and amiable—and his belief—prominent in every page of the narrative which he dictated to his friend Mr. Galt—that preaching and prophecy had predestined him to play a great part before mankind, and be an example to all posterity, did no one any harm, and himself some good.

As his life was long and laborious, his productions are very numerous. He painted and sketched in oil upwards of four hundred pictures, mostly of an historical and religious nature, and he left more than two hundred original drawings in his portfolio. His works were supposed by himself, and for a time by others, to be in the true spirit of the great masters, and he composed them with the serious ambition and hope of illustrating Scripture and rendering Gospel truth more impressive. No subject seemed to him too lofty for his pencil; he considered himself worthy to follow the sublimest flights of the prophets, and dared to hymn the effulgence of God's glory and the terrors of the day of Judgment. The mere list of his works makes us shudder at human presumption—Moses receiving the Law on Sinai—the Descent of

the Holy Ghost on the Saviour in the Jordan—the Opening of the Seventh Seal in the Revelations—Saint Michael and his Angels casting out the Great Dragon—the mighty Angel with one foot on sea and the other on earth—the Resurrection!—and many others of the same class! With such magnificence and sublimity who but a Michael Angelo could cope?

In all his works the human form was exhibited in conformity to academic precepts—his figures were arranged with skill—the coloring was varied and harmonious—the eye rested pleased on the performance, and the artist seemed, to the ordinary spectator, to have done his task like one of the highest of the sons of genius. But below all this splendor there was little of the true vitality—there was a monotony, too, of human character—the groupings were unlike the happy and careless combinations of nature, and the figures seemed distributed over the canvas by line and measure, like trees in a plantation. He wanted fire and imagination to be the true restorer of that grand style which bewildered Barry and was talked of by Reynolds. Most of his works—cold, formal, bloodless, and passionless—may remind the spectator of the sublime vision of the Valley of dry bones, when the flesh and skin had come upon the skeletons, and before the breath of God had informed them with life and feeling.

Though such is the general impression which the works of West make, it cannot be denied that many are distinguished by great excellence. In his Death on the

Pale Horse, and more particularly in the sketch of that picture, he has more than approached the masters and princes of the calling. It is, indeed, irresistibly fearful to see the triumphant march of the terrific phantom, and the dissolution of all that earth is proud of beneath his tread. War and peace, sorrow and joy, youth and age, all who love and all who hate, seem planet-struck. The Death of Wolfe, too, is natural and noble, and the Indian chief, like the Oneida warrior of Campbell,

“A stoic of the woods, a man without a tear,”

was a happy thought. The Battle of La Hogue I have heard praised as *the best* historic picture of the British school, by one not likely to be mistaken, and who would not say what he did not feel. Many of his single figures, also, are of a high order. There is a natural grace in the looks of some of his women which few painters have ever excelled.

West was injured by early success; he obtained his fame too easily—it was not purchased by long study and many trials—and he rashly imagined himself capable of anything. But the coldness of his imagination nipped the blossoms of history. It is the province of art to elevate the subject in the spirit of its nature—and brooding over the whole with the feeling of a poet, awaken the scene into vivid life and heroic beauty; but such mastery rarely waited upon the ambition of this amiable and upright man.

From Comptes Rendus.

NEW PHOTOGRAPHIC PROCESS ON GLASS.

BY J. B. LEMOYNE.



THE process in question is completely practical, and does not merely refer to a few accidental occurrences. Nearly a year ago, I found that impressions upon glass sometimes presented a positive aspect, and after a short period my researches in this direction furnished me with tolerably good specimens; but I did not succeed in arriving at a true and constant method until after making a long series of continuous attempts; these have extended to the present time.

The object of most of my experiments was to overcome the well known inconveniences of the albuminous plates, and independently of the positive process, I have made considerable progress in the production of the impressions by the following modifications which in fact constitute a new method of preparation:—

1. Purification of the albumen of the whites of eggs by keeping them for a long time, and even adding sugar to produce slight fermentation, which clarifies them much better than the beating process which is generally adopted. This first addition of sugar (eight grains to each white of egg) does not prevent the necessity of subsequently adding the quantity already recommended (thirty-eight to forty-six grains) to obtain greater sensibility to light; and with the processes I afterwards employ, the presence of this substance increases the adhesion of the coating, instead of diminishing it, which has been urged as an objection.

2. Iodizing the albuminous part, after it has dried, by immersing it in a bath of tincture of iodine, to which 1-10 part of its volume of nitric acid of specific gravity 1.380 has been added.

This method is very simple, and is not attended with any of the defects inherent to the use of albumen containing iodide of potassium in solution. There is but one of the processes known which could be

brought into competition with this; it is the employment of the vapor of iodine; but, the moist method has the advantage, both in the rapidity of execution and the simplicity of the apparatus.

3. Omission of the use of acetic acid, and employing a solution of nitrate of silver (one part to ten,) for rendering the plates sensitive.

I do not know whether acetic acid is really necessary upon albuminated glass, when gallic acid is used to bring out the image; but, with the sulphate of iron, it is undoubtedly an expensive superfluity; moreover, the volatility of this acid is a cause of spontaneous changes in the solutions, and this also is a serious inconvenience.

4. The use of a second bath of nitrate of silver (one to twenty,) after washing the plates with fluoride of potassium, and as an accelerating agent. The object of this operation is not only to increase still more the sensibility; but especially transform the excess of fluoride of potassium into fluoride of silver, and thus to prevent its acting upon the glass, and causing the separation of the albumen; it is also useful, but in regard to the first point only, whatever the accelerating agent used may be.

5. Substitution of a strong bath of sulphate of iron, at the temperature of 194 degrees Fahrenheit for the gallic acid generally used for bringing out the image. This modification produces an enormous increase of sensibility; moreover, the high temperature furnishes images of a very light shade, and this is the essential point upon which the production of proofs upon glass depends; lastly, the opacity is less than by the other processes; hence, in regard to the productions upon paper, there results a softness which does not exclude delicacy, and the abuse of which has hitherto frequently been urged as an objection to the employment of albuminous films.

6. Fixing the proof in four or five minutes by the perfect solution of the iodide

of silver, by means of a bath of cyanide of potassium and hyposulphite of soda of proper strength.

This method of fixing is superior in every respect, both to the bromide of potassium, and the hyposulphite generally employed unmixed. It gives in a very short time, and without injuring the proofs, not only unexceptionable fixation, but, also complete transparency in the facts which have not taken the impression, and lastly, considerable increase in the adhesion of the entire coating. It may, moreover, be easily applied to all the known processes of photography upon glass, and even without any doubt to the operations upon paper.

The proofs obtained by this process consist of opaque, yellowish white images, lying in a diaphanous medium, and presenting, therefore, the positive or negative aspect, according as to whether they are placed upon a darker or lighter ground.

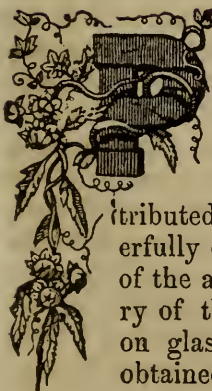
As negative proofs, they resist changes of temperature better, are more transparent (which allows of their being produced by a feeble light,) and lastly, as I have stated, they furnish softer drawings upon paper

than those prepared by other processes. As positive proofs, and to allow of their being included under this head, the side of the albumen has only to be coated with black paint; they present a clearness and delicacy comparable to metallic plates, infinitely more beauty of outlines; and lastly, a variety of shades, of which many are very artistic.

In regard to the time requisite for exposure to the light, I may add that I have obtained landscapes by the sun in a second (with a plano-convex objective, consisting of a combination of glasses, furnished with a diaphragm, the aperture in which was O.^m 03,) and portraits in the shade out-of-doors in four or five seconds, and in a room, in from eight to fifteen seconds (with the same object-glass without the diaphragm.) Moreover, the proofs are naturally wet; and hence, even if the metallic plate sometimes offers a slight advantage in regard to rapidity, it loses it completely when inversion of the images would be inadmissible; and apparatus for reversing it, is required.

From La Lumiere.

COLLODION.



PHOTOGRAPHY has made rapid progress during the last two years, especially in the manner of operating on paper and glass.

To M. Niepce must be attributed the merit of having powerfully contributed to the progress of the art by his beautiful discovery of the process of albumenizing on glass. The admirable proofs obtained by M. Martens by this means present so much beauty of design, as well as clearness and finish of execution, that they leave nothing further to be desired. Still there are other objections to which this process is liable; the

long exposure in the camera to obtain an image, compels us to limit its application to landscape and architecture, and to renounce its employment for portraits.

I will explain the particulars of a process on glass by means of collodion which rivals in beauty the albumenized plate and even exceeds the daguerreotype in sensibility to the light.

In a treatise on photography which I published in London, two years ago, I published the use of collodion in photography, and communicated this discovery to the most celebrated photographers of London; but it is only lately that all its advantages have been appreciated. The process is very simple. It consists simply in the use

of a coating of collodion, instead of the albumen of M. Niepce. A good manipulator, accustomed to albumenized glass, cannot fail to succeed with collodion, and to obtain the most fortunate results. To obtain an image, two or three different methods, which I will point out, may be followed. We will divide the manipulations into four different operations :

1. The preparation of the collodion
2. The application of the collodion on the glass.
3. The development of the image.
4. The fixing.

Preparation of the Collodion.—Collodion is prepared by dissolving gun-cotton in ether. It is necessary that the gun-cotton and ether employed for this preparation should be perfectly pure, that is to say, contain not the smallest particle of sulphuric or nitric acid.

Collodion is more or less liquid according to the proportions of gun-cotton and ether employed. Its fluidity must be of such a degree that by pouring it on a piece of glass, it flows and spreads easily over the whole surface. If it is too thick, some pure ether must be added until it has acquired a suitable degree of fluidity for operating with success ; a few attempts will be sufficient for this purpose. If the collodion was too thick, it would be difficult to obtain a uniform surface ; if on the contrary, it was too fluid, its sensibility would be less.

The collodion is poured into a six-ounce bottle containing 53 grains of iodide of ammonia, and 2 grains of fluoride of potassium with 4 or 5 drops of distilled water. The iodide of ammonia should not be entirely dissolved in the water ; that is to say the proportion of water ought not to be sufficient to completely dissolve it. It is sufficient if the salt is almost dissolved ; the solution is completed by the addition of collodion.

It is of importance to pay attention to these particulars for the following reason ; if too much water had been placed in the mixture, the coating of collodion would not adhere to the glass, and would be liable to get detached in the bath of nitrate of silver. Shake the bottle once or twice, and let it settle until the liquid becomes clear and limpid. Its color will be a light

yellow ; but if, by chance, it should happen that the ether or collodion has preserved any traces of acid, there would then be a decomposition of the iodide of ammonia, and the iodine, in getting free, would give the liquid a deep-red color.

This method is most expeditious, but it also presents a few more difficulties than that with iodided collodion, which I will explain.

Put into a six-ounce bottle 12 grains of iodide of potassium and 7 or 8 grains of iodide of silver ; add a few drops of water, but not more than sufficient to dissolve the iodide of potassium ; after this, fill the bottle with collodion made of a suitable degree of fluidity ; shake it once or twice and allow the mixture to settle for two or three days, until it is perfectly clear ; it should be almost white ; in general, it is of a rather yellowish tinge.

2d OPERATION.—Preparing the Glass to receive the Image.—Fix the glass on a piece of gutta percha (this substance sticks with ease to the glass when it is warm) : pour on it a few drops of ammonia mixed with tripoli : rub the glass with cotton, in small circles, as is done for the daguerreotype plate ; then take off, with another ball of cotton, the tripoli remaining on the glass ; pour on it a second mixture of tripoli and alcohol, and rub, as with the former mixture. Perhaps there may remain a few more particles of tripoli and of the fibres of the cotton ; to get rid of them, pour out a little pure alcohol, make a very close ball, so that none of the fibres of the cotton may appear, and rub the glass very carefully ; rub for the last time, with a new dry ball. One may know that it is fit for use when on breathing upon it, the humidity is uniformly condensed over the whole surface.

Hold the glass by its gutta percha handle and pour the collodion gently on the top, inclining it from one side to the other, so that the liquid may spread over it to the corners, then pour back into the bottle, by one of the corners, any excess of the liquid. The glass will then appear covered with very fine grooves, extending perpendicularly in the direction that the liquid flowed ; by inclining it in another direction these grooves become mixed together and the coating is thin and uniform. Then before the collodion has time to dry, the glass is

placed in a bath of nitrate of silver with this prepared side under.

This bath ought to contain 40 grains of nitrate of silver in an ounce of distilled water. The surface of the glass will not be wet immediately. There is required a certain space of time for the ether to be mixed with the water; the glass is therefore left in the bath for at least half a minute without allowing it to touch the bottom of the vessel supporting it by means of a silver or platinum hook.

As soon as it is apparent that the glass is covered with a uniform whitish coating and that the water flows easily over the whole surface, it is taken out and placed immediately in the frame of the camera; not more than ten minutes or a quarter of an hour should be spent in using it; the sooner the better.

Development of the image.—Place the glass on a rest, and pour rapidly over the surface a solution composed of 2 parts of pyrogallie acid, 50 parts of glacial acetic acid and 500 parts of water; if the time of exposure in the camera has not been sufficient a few drops of nitrate of silver may be added, but generally it is unnecessary.

As soon as the image is well developed, which takes about two minutes, it is washed with running water, and afterwards fixed by pouring on the image a saturated solution of hyposulphite of soda. The coating of iodide of silver disappears and the

image appears, which is sometimes positive, it is then well washed in water to get rid of all the hyposulphite, after this the glass is dried either by a lamp or spontaneously in the air, before drying the coating is very soft, it afterwards hardens and sticks to the glass like albumen. By means of this process, it would be easy if desired to obtain at first a positive image of great beauty, possessing much more force and clearness than those by the daguerreotype, without having, like the latter, the inconvenience of a mirroring, which only allows of seeing them well in a certain position. To obtain this result, the time of exposure in the camera ought to be much shorter than for a negative proof; but this image by which it is desired to make a positive, should be allowed to remain in a mixture of pyrogallie acid, with one or two drops of nitrate of silver.

Then the luminous parts are formed with white coatings, having the same character as the crystalline coatings formed by mercury in the daguerrean process. When the positive image is well developed, it is fixed by the same means as the negative.

I should add in closing, that in general the time necessary to obtain a good negative in the shade with an ordinary German lens, is three or four seconds, that is to say, more than half less time than is necessary to obtain the same result by the daguerreotype.

MICROSCOPIC PHOTOGRAPHS.

ROYAL INSTITUTION, EDINBURGH.

As the photographic delineation of microscopic objects appears to be occupying the attention of many at the present moment, I beg to inclose one or two examples in that way, in the hope of obtaining some further information on the subject through the medium of your journal, should you consider them sufficiently noteworthy. The collodion process on glass offers peculiar

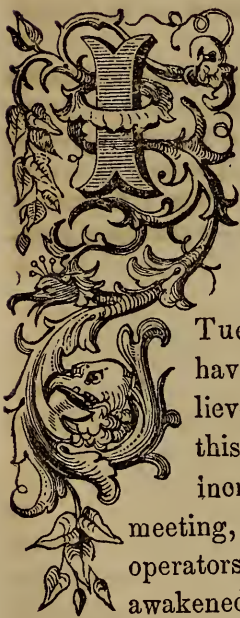
facilities for working with the microscope; but as the accumulation of the plates is highly inconvenient, it appeared desirable that some method should be devised for the preservation of the picture without the glass. This may be effected by transferring it to a piece of waxed paper, which forms a most excellent substitute. The process is very easy. The picture having been obtained, the film of collodion is floated off

the glass under water, and removed to a bath of isinglass so weak as to be fluid when cold; in this bath the waxed paper having been previously soaked for a few minutes, the arrangement and extension of the pellicle is effected by gently moving it with the fingers, and then carefully raising up both it and the paper together, holding them so as to let the water run between them. It is necessary to hold both, for the film slips about very easily. Blotting paper will then absorb some of the superfluous water, and the remainder may be forced out by rubbing slightly, but always in one direction. By drying the whole under pressure, the picture will be found

firmly adherent to the paper. I am far from offering the specimens sent as perfect examples of what may be effected by the aid of the microscope,—but shall be glad to know whether the transfer of the film of collodion from the glass plate to the waxed paper may be considered an improvement, as it would certainly seem to offer some advantages. I may observe with respect to the production of images of transparent objects, that there may be some doubt whether in all cases the photographic picture is true: for the light being decomposed in its passage through them, will of course, affect the faithfulness of the image.

E. W. DALLAS.

GOSSIP.



T should be remembered by our readers, that the New York State Daguerrean Association hold their third semi-annual meeting in the city of New York, on the first

Tuesday of October. We have every reason to believe that the interest in this institution has greatly increased since the last

meeting, and that the minds of operators generally are more awakened to the importance of

the organization, and we expect to see a larger number of daguerrean artists assembled on this occasion than at any previous meeting. The beneficial results of all organizations of this kind have been too well laid before the people and argued to need any further comments, and we shall content ourselves on this occasion with reminding our readers of the near approach

of the time of meeting, and urge upon them the propriety of attending. We have seen no notice published, and we are fearful that this neglect will be the means of preventing many, who would have done so had sufficient notice been given, from attending.

We are in hopes that at this meeting more strenuous exertions will be made to give the meeting a more decided intellectual cast and that the various subjects pertaining to the art—which are of so much importance—will be fully debated, and these debates widely published. We do not see why our daguerreotypists should not have an annual public exhibition of their works independent of the State and American Institute fairs, and we should be pleased to have the matter take some tangible form at the October meeting. We wish to see the subjects of art generally, broached and discussed, for they would greatly benefit daguerreans, particularly the younger portion of the profession. The various branches of fine arts are too much

neglected. Their study would not only be a source of infinite pleasure, but of intrinsic value. Many of the imperfections, in style, position and taste, which, are now so prominent in a majority of the daguerreotypes taken would be corrected, and in course of time the improved productions of those who are thus educated would drive entirely out of market the miserable abortions which now flood the country, and out of the community of daguerreans, those who take them. Such a consummation would not only be beneficial to the art itself, but to the people at large. We must repeat here, the remarks we made in a former number.

The mind of man will expand with the food it feeds upon, and it is utterly impossible to partake of the fountain of knowledge without invigorating the mental system. It is those, therefore, who devote themselves to a thorough investigation, both practically and theoretically, of the profession or art to which they belong, that the vulgar and sluggish mind must eventually yield. There can be no disputing this proposition. It is a fact that has been substantiated by historical record. We have only to call to mind such names as Sir Humphry Davy, Newton, Brewster, Wedgewood, Morse, Draper, Renwick, Webster, Clay, Peel, Burke, West, Reynolds, Hogarth, Cole, Huntingden, Elliott, Daguerre, and a host of other equally bright spirits, to be convinced of its truth.

Those who avail themselves of the experience and instruction of others can only do so to their profit. Even the child may often instruct the aged; and how much more profitable, therefore, must be the counsel of those brilliant minds who have devoted whole life times to the development of art and science.

The same spirit that should actuate us to study the views and measures of others should also induce us to impart all the

knowledge we obtain to others, for it is the only true system of mutual improvement.

Let us, therefore, witness a numerous meeting in October; one not only calculated to establish harmony and brotherly feeling among daguerreans, but mutual improvement and liberality.

Since the above remarks were in type we have received the following on the same subject. They are pertinent and to the point.

Rochester, Sept. 15, 1852.

FRIEND SNELLING: As the semi-annual meeting of the N. Y. S. D. Association is to convene in your city next month, and feeling desirous that there should be a large attendance from all parts of the state, and country, induces me, (through the columns of your valuable Journal, to urge upon all operators, and especially upon its members, punctual attendance at this meeting. The time has arrived when it becomes extremely important for daguerreotypists to unite, and to treat each other as friends engaged in a common cause, and that cause, the advancement of the art. If this meeting is fully represented by its members and others, a general benefit would be experienced; ideas will be imparted to each other, which they will carry home and improve upon; if they love the art, they will be cheered with the thought that they have brethren engaged to counsel with and assist them if needed; that from these combined efforts a new impetus will be given, and ere long the association will be enabled to have galleries of art in different cities throughout the state and Union, to which the public can be invited, the art elevated to its proper place, the *Art of Arts*; the prices will advance, the demand for pictures of a larger size will be threefold, and instead of an empty-pocketed, empty-headed class of individuals, you will find the daguerreotypists of New York

State, taking rank with the first men in the community. Why, it has been almost a disgrace to be called a daguerrean artist, and at the same time the skillful operator is conferring on the community a greater amount of good than almost any other profession. Why, fellow artists, why will you sleep in ignorance of these facts? why will you not push forward for your own sakes? come and join this association, determined you will do all you can to promote its interests. If you know any thing that will be advantageous, reveal it, and by a union of thought and action, benefit yourself, the art you love, and the world, and make the N. Y. State Daguerrean Association, the most useful association in the country.

E. T. WHITNEY.

— In our next number we shall give two splendid engravings of the ANTHONY PRIZE PITCHER. It will be seen by Mr. Anthony's notice, published in the August number and repeated in this, that nearly if not all the objections to the terms have been met, and that there can be no further reason for our daguerrean artists withholding competitorship. The prize is a magnificent one, and worthy the best exertions of all. With the engraving we shall give a letter press description, with many interesting facts connected with it. Already some twenty of our artists have sent in their names, and many others have signified their intention to do so.

— In our article on the Hillotype in our July number, we spoke of an operator "mysteriously shaking his head" when asked his opinion of that discovery. This gentleman has since informed us that he did not intend his remarks or actions to give the construction which we put upon them, but wishes to be understood as a firm believer in the Hillotype.

— New York city has been visited since our last by a host of daguerreans from all parts of the country, but there seems to be nothing new, of any importance, stirring among them.

— Our readers must excuse the paucity of editorial in this number, which is entirely owing to the lameness of our right hand. There are many things we felt anxious to communicate, but the pain which the action of writing creates prevents us, and our day of publication is too near at hand to admit of further delay.

— We unhesitatingly lay the following process before our readers in full confidence of its utility.

GALENA, Ill., Sept. 8, 1852.

Dear Journal: I have for a short time past been using a new preparation for scouring plates. To me it is new, and I think to most others, as I have never seen its use mentioned. With it I can clean plates *perfectly clean* in less than one quarter of the time of any other substance I ever used, and then it leaves the silver pure. It is equally well adapted to cleaning gilded plates, as others. I hasten to give it to your readers, as I think it a great saving of labor and an improvement in pictures—of course it does not do away with galvanizing—as no plate should be used without being first properly galvanized. I am convinced that all who try it will acknowledge that it alone is worth the price of the Journal for one year.

Take pure mineral naphtha say four oz. and add about 40 drops sulphuric ether. Shake well and cork tight. Now take one oz. alcohol and add a few drops of the naphtha and ether. Shake well and use as alcohol and ammonia, or acid water with the rotten stone. I sprinkle a little rotten stone on the plate and then pour on a little of the naphtha and ammonia, rub over the

plate briskly with the small patch of cotton flannel, a few rubs over the plate will be sufficient; now rub off with a clean patch, and the plate will be a clear deep blue or dark color. Take a third patch and breathe on the plate and wipe off briskly. The plate will now be smoothe and clean, and ready for buffing.

If any who wish to try it cannot get the naphtha, they can get the mineral tar, or Petrolian, or Barbadoes tar, or Seneca oil, at almost any drug store in the country, and by distilling the above in a glass retort and receiver, naphtha will pass over in the form of steam, which condenses to the oil on cooling, and asphaltum will be the residue. Try it, ye who want to save labor, and have clean plates.

Truly a friend of the Art,

A. HESLER.

— Messrs. Beckers & Piard have shown us two very superior stereoscope portraits, which sufficiently proves what many of our readers disbelieve; that portraits from life can be applied to the stereoscope. The effect of these pictures in the stereoscope was beautiful in the extreme, and we have no doubt that Messrs. Beckers & Piard will find it to their interest to pursue their practice in this branch of their art to perfection.

THE DRAMA.—The remembrance of the oldest play-goer can find no parallel to the preparations for the festivities of the coming winter. Artists, musical and theatrical, are arriving by every steamer. Eleven theatrical establishments have thrown open their doors to residents and strangers, concert rooms are in demand, and on every dead wall, pump, hydrant and brick pile, are attractive announcements in all the "pride and pomp" of fancy colored inks, directing pleasure seekers where and how

to expend their leisure hours. First on the list is the metropolitan establishment, the Broadway. The season has opened with vigor, and the engagement of Julia Dean, a most promising young actress, and a beautiful woman withal, was remunerative, while that of the favorite Irish comedian, Collins, has been equally successful. The Bateman Children, at the present writing, are now at this house in connection with Collins, and their wonderful performances, marked by great improvement since their visit to Europe, are exciting the greatest enthusiasm. Their acting, unlike most prodigies, is earnest, truthful and effective, and the delineations of the "Young Couple" are exceedingly entertaining. Forrest, Barney Williams and wife, and other stars are to appear during the season. Burton, through illness, has not appeared at his popular little house for some time past, but his place has partially been supplied by Lysander Thompson, a "dialect" actor, whose masterly performances of Tyke in the School of Reform, and Ezekiel Homespun in the Heir at Law, have stamped him as a consummate artist. The additions to Burton's company are Mr. Norton, Mr. Fisher and Mrs. Bernard, all "importations." Miss Fitzpatrick, Mr. Wheatleigh, W. M. Fleming, aided by a rather weak dramatic company have filled up the off nights of the ballet company with Madame Thillon, at Niblo's. That universal favorite Jas. Browne is again with us, and is playing his popular Robert Macaire at this house. Hamblin, satisfied with the strength of his stock company, an excellent one by the way, is playing the legitimate drama, backed up by melo drama, farces, &c. The Lyceum has reopened with Wallack as its manager. The business thus far has been "paying," and we trust the enterprize will prove more successful under the control of the new lessee than it was under Brougham's direc-

tion. It is a beautiful and convenient house and should be sustained. The National Theatre continues its prosperous career under Purdy's management; while the sickness of Thorne has led to a most deplorable result, compelling him to close the New York Theatre, ere the completion of the third week of its new season. Madame Thillon, Eliza Logan, Neafie, an excellent ballet troupe, and the Bateman Children, were all tried, and resulted, we regret to say, all in partial failure. The house will remain closed until Thorne is restored to health. White's Varieties is the name of a neat little vaudeville establishment in the Bowery near Chatham Square, under the direction of White the negro singer. The Museum Saloon continues under the direction of C. W. Clarke, and the Melodean and Franklin Museum, though not exactly theatrical establishments may be considered as "side shows" are managed by Lea. These with Madame Sontag, Alboni, Camilla Urso, and other musical celebrities, will make all things go as

"Merry as marriage bells."

PREMIUM FOR THE BEST DAGUERREOTYPE.—One year since I offered a reward of *five hundred dollars* for the greatest improvement that should be made in the Photographic art during the year 1851. No applications of any importance were made for it, probably in consequence of the natural modesty of inventors. Inasmuch, however, as the money has been offered, I consider that it no longer belongs to myself but to the Art. Therefore, with the advice and consent of Professor Renwick, Morse and Draper, who were appointed the judges in the matter. I have decided to invest the above amount in a MASSIVE SILVER PITCHER, of appropriate design, to be awarded as a prize for THE BEST FOUR DAGUERREOTYPES that shall be offer-

ed for competition previous to November 1st, 1853.

No competitor will be allowed to exhibit more than one Daguerreotype of each size.

The Daguerreotypes offered for competition must be on what is called the full, two-third, half and quarter sizes.

After the decision of the judges the pictures will again become the property of the artists who made them, and be returned as may be directed.

A description of the method of operating in the production of the picture offered, must accompany each picture, mentioning the brand of plate and the makers of the various chemicals used, as far as the operator may be able to tell.

In order that there may be no complaint as to partiality, the pictures must be sent anonymously, accompanied by a sealed package containing the name of the artist and the method of operating. The pictures and sealed envelopes will be marked with corresponding numbers in the order of their reception, and the latter will only be opened after the decision of the judges.

As this prize is offered as a test of the skill of manipulators and not the excellence of the camera, no instrument larger than the regular full size must be used. Daguerreotypes taken by the mammoth camera will be excluded.

Artists of all countries are invited to send pictures for competition.

All letters of enquiry upon the subject will receive prompt attention, and it is earnestly hoped the competition will be as spirited as possible.

All who intend to compete for the prize should send in their names as early as possible, as lists of the competitors will from time to time be published.

The pictures must be forwarded to my address, free of expense.

E. ANTHONY.

THE PHOTOGRAPHIC ART-JOURNAL.

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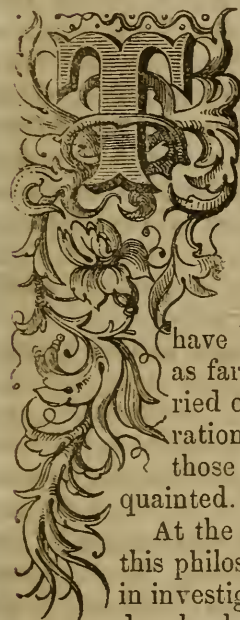
PHOTOGRAPHY.*

BY ROBERT HUNT.

PROFESSOR OF MECHANICAL SCIENCE IN THE MUSEUM OF PRACTICAL GEOLOGY,
AUTHOR OF
"RESEARCHES ON LIGHT," "THE POETRY OF SCIENCE," ETC.

CHAPTER X.

THE PROCESSES OF SIR JOHN HERSCHEL.



HE researches of Sir John Herschel have been principally directed to the investigation of the physical laws which regulate the chemical changes we have been considering. The analyses of the prismatic spectrum have been most complete, and as far as they have been carried out, go to prove the operation of forces other than those with which we are acquainted.

At the same time, however, as this philosopher has been engaged in investigations of this high order, he has, from the multitude of his experiments, been successful in producing several processes of great beauty. There are not any which are to be regarded as peculiarly sensitive—they are indeed for the most part rather slow—but the manipulation required is of the easiest character, and the results are most curious and instructive.

The philosophy which is for ever united with the scientific investigations of Sir John Herschel is too valuable to be omitted from any description of the processes which he recommends: the following quotations are therefore taken from his communication

to the Royal Society, and linked together by my own remarks in such a manner as it is hoped will be most easily understood by the unscientific amateur.

CYANOTYPE.—The processes in which cyanogen is employed are so called. Sir John Herschel thus introduces the subject of his experiments with these salts:—"I shall conclude this part of my subject by remarking on the great number and variety of substances which, now that the attention is drawn to the subject, appear to be photographically impressible. It is no longer an insulated and anomalous affection of certain salts of silver or gold, but one which, doubtless, in a greater or less degree pervades all nature, and connects itself intimately with the mechanism by which chemical combination and decomposition is operated. The general instability of organic combinations might lead us to expect the occurrence of numerous and remarkable cases of this affection among bodies of that class, but among metallic and other elements inorganically arranged instances enough have already appeared, and more are daily presenting themselves, to justify its extension to all cases in which chemical elements may be supposed combined with a certain degree of laxity, and to speak in a *tottering equilibrium*. There can be no doubt that the process, in a great majority, if not in all cases, which have been noticed among inorganic substances, is a deoxidizing one, so far as the more refrangible rays are concerned. It is obviously so in the cases of gold and silver. In that of the bichromate of potash it is most

* Continued from page 150, Vol. 4, No. 3.

probable that an atom of oxygen is parted with, and so of many others. A beautiful example of such deoxidizing action on a non-argentine compound has lately occurred to me in the examination of that interesting salt, the ferrosesquicyanuret of potassium, described by Mr. Smee in the Philosophical Magazine, No. 109, September, 1840, and which he has shown how to manufacture in abundance and purity, by voltaic action on the common, or yellow ferrocyanuret. In this process nascent oxygen is absorbed, hydrogen given off; and the characters of the resulting compound in respect of the oxides of iron, forming as it does Prussian blue with protosalts of that metal, but producing no precipitate with its persalts, indicate an excess of electro-negative energy, a disposition to part with oxygen, or, which is the same thing, to absorb oxygen (in the presence of moisture), and thereby to return to its pristine state, under circumstances of moderate solicitations, such as the affinity of protoxide of iron (for instance) for an additional dose of oxygen, &c.

"Paper simply washed with a solution of this salt is highly sensitive to the action of light. Prussian blue is deposited (the base being necessarily supplied by the destruction of one portion of the acid, and the acid by decomposition of another). After half an hour or an hour's exposure to sunshine, a very beautiful negative photograph is the result, to fix which, all that is necessary is to soak it in water, in which a little sulphate of soda is dissolved, to ensure the fixity of the Prussian blue deposited. While dry the impression is dove-color or lavender blue, which has a curious and striking effect on the greenish yellow ground of the paper, produced by the saline solution. After washing, the ground color disappears, and the photograph becomes bright blue on a white ground. If too long exposed, it gets 'over-sunned,' and the tint has a brownish or yellowish tendency, which however is removed in fixing: but no increase of intensity beyond a certain point is obtained by continuance of exposure.

"If paper be washed with a solution of ammonio-citrate of iron, and dried, and then a wash passed over it of the yellow ferrocyanuret of potassium, there is no immediate formation of true Prussian blue,

but the paper rapidly acquires a violet-purple color, which deepens after a few minutes, as it dries, to almost absolute blackness. In this state it is a positive photographic paper of high sensibility, and gives pictures of great depth and sharpness, but with this peculiarity, that they darken again spontaneously on exposure to the air in darkness, and are soon obliterated. The paper, however, remains susceptible to light, and capable of receiving other pictures which in their turn fade, without any possibility (so far as I can see) of arresting them; which is to be regretted, as they are very beautiful, and the paper of such easy preparation. If washed with ammonia or its carbonate, they are for a few moments entirely obliterated, *but presently reappear, with reversed lights and shades.* In this state they are fixed, and the ammonia, with all that it will dissolve, being removed by washing in water, their color becomes a pure Prussian blue, which deepens much by keeping. If the solution be mixed, there results a very dark violet-colored ink, which may be kept uninjured in an opaque bottle, and will readily furnish, by a single wash, at a moment's notice, the positive paper in question, which is most sensitive when wet.

"It seems at first sight natural to refer these curious and complex changes to the instability of the cyanic compounds; and that this opinion is to a certain extent correct, is proved by the photographic impressions obtained on papers to which no iron has been added beyond what exists in the ferrocyanic salts themselves. Nevertheless, the following experiments abundantly prove that in several of the changes above described, the *immediate action* of the solar rays is not exerted on these salts, but on the iron contained in the ferruginous solution added to them, which it deoxidizes or otherwise alters, thereby presenting it to the ferrocyanic salts in such a form as to precipitate the acids in combination with the peroxide, or protoxide, of iron, as the case may be. To make this evident, all that is necessary is *simply to leave out the ferrocyanate* in the preparation of the paper, which thus becomes reduced to a simple washing over with the ammonio-citric solution. Paper so washed is of a bright yellow color, and is apparently little, but in reality highly sensitive to photogra-

phic action. Exposed to strong sunshine, for some time indeed, its bright yellow tint is dulled into an ochrey hue, or even to grey, but the change altogether amounts to a moderate per centage of the total light reflected, and in short exposures is such as would escape notice. Nevertheless, if a slip of this paper be held for only four or five seconds in the sun (the effect of which is quite imperceptible to the eye), and when withdrawn into the shade be washed over with the ferrosesquicyanate of potash, a considerable deposit of Prussian blue takes place on the part sunned, and none whatever on the rest; so that on washing the whole with water, a pretty strong blue impression is left, demonstrating the reduction of iron in that portion of the paper to the state of protoxide. The effect in question is not, it should be observed, peculiar to the ammonio-nitrate of iron.

"The ammonio and potassa-tartrate fully possess, and the per-chloride *exactly neutralized*, partakes of the same property: but the experiment is far more neatly made, and succeeds better with the other salts."

In further development of these most interesting processes Sir John Herschel says:—"The varieties of cyanotype processes seem to be innumerable, but that which I shall now describe deserves particular notice, not only for its pre-eminent beauty while in progress, but as illustrating the peculiar power of the ammoniacal and other persalts of iron above-mentioned to receive a latent picture, susceptible of development by a great variety of stimuli. This process consists in simply passing over the ammonio-citrated paper on which a latent picture has been impressed, *very sparingly and evenly*, a wash of the solution of the common yellow ferrocyanate (prussiate) of potash. The latent picture, if not so faint as to be quite invisible (and for this purpose it should not be so), is negative. As soon as the liquid is applied, which cannot be in too thin a film, the negative picture vanishes, and by very slow degrees is replaced by a positive one of a violet-blue color on a greenish yellow ground, which at a certain moment possesses a high degree of sharpness, and singular beauty and delicacy of tint. If at this instant it be thrown into water, it passes immediately to Prussian blue, losing at the same time, however, much of its sharpness, and some-

times indeed becoming quite blotty and confused. But if this be delayed, the picture, after attaining a certain maximum of distinctness, grows rapidly confused, especially if the quantity of liquid applied be more than the paper can easily and completely absorb, or if the brush in applying it be allowed to rest on, or be passed twice over any part. The effect then becomes that of a coarse and ill-printed woodcut, all the strong shades being run together, and a total absence prevailing of half lights.

"To prevent this confusion, gum-arabic may be added to the prussiated solution, by which it is hindered from spreading unmanageably within the pores of the paper and the precipitated Prussian blue allowed time to agglomerate and fix itself on the fibres. By the use of this ingredient also, a more thinner and more exuable film may be spread over the surface; and *when perfectly dry*, if not sufficiently developed, the application may be repeated. By operating thus I have occasionally (though rarely) succeeded in producing pictures of great beauty and richness of effect, which they retain (if not thrown into water) between the leaves of a portfolio, and have even a certain degree of fixity—fading in a strong light and recovering their tone in the dark. The manipulations of this process are, however, delicate, and complete success is comparatively rare.

"If sulphocyanate of potash be added to the ammonio-citrate, or ammonio-tartrate of iron, the peculiar red color which that test induces on persalts of the metal is not produced, but it appears at once on adding a drop or two of dilute sulphuric or nitric acid. This circumstance, joined to the perfect neutrality of these salts, and their power, in such neutral solution, of enduring, undecomposed, a boiling heat, contrary to the usual habitudes of the peroxide of iron, together with their singular transformation by the action of light to proto-salts, in apparent opposition to a very strong affinity, has, I confess, inclined me to speculate on the possibility of their ferruginous base existing in them, not in the ordinary form of peroxide, but in one isomeric with it. The non-formation of Prussian blue, when their solutions are mixed with prussiate of potash, and the formation in its place of a deep violet colored liquid

of singular instability under the action of light, seems to favor this idea. Nor is it altogether impossible that the peculiar "prepared" state superficially assumed by iron under the influence of nitric acid, first noticed by Keir, and since made the subject of experiment by M. Schönbein and myself, may depend on a change superficially operated on the *iron itself* into a new metallic body isomeric with iron, unoxidizable by nitric acid, and which may be considered as the radical of that peroxide which exists in the salts in question, and possibly also of an isomeric protoxide. A combination of the common protoxide with the isomeric peroxide, rather than with the same metal in a simply higher state of oxidation, would afford a not unpalatable notion of the chemical nature of that peculiar intermediate oxide to which the name of "Ferroso-ferric" has been given by Berzelius. If (to render my meaning more clear) we for a moment consent to designate such an isomeric form of iron by the name siderium, the oxide in question might be regarded as a sideriate of iron. Both phosphorus and arsenic (bodies remarkable for sesqui-combinations) admit isomeric forms in their oxides and acids. But to return from this digression.

"If to a mixture of ammonio-citrate of iron and sulphocyanate of potash a small dose of nitric acid be added, the resulting red liquid, spread on paper, spontaneously whitens in the dark. If more acid be applied till the point is attained when the discoloration begins to relax, and the paper when dry retains a considerable degree of color, it is powerfully affected by light, and receives a positive picture with great rapidity, which appears at the back of the paper with more distinctness than on its face. The impression, however, is pallid, fades on keeping, nor am I acquainted at present with any mode of fixing it.

"If paper be washed with a mixture of the solutions of ammonio-citrate of iron and ferrosesquicyanate of potash, so as to contain the two salts in about equal proportions, and being then impressed with a picture, be thrown into water and dried, a negative blue picture will be produced. This picture I have found to be susceptible of a very curious transformation, preceded by total obliteration. To effect this it must be washed with a solution of proto-nitrate

of mercury, which in a little time entirely discharges it. The nitrate being thoroughly washed out and the picture dried, a smooth iron is to be passed over it, somewhat hotter than is used for ironing linen, but not sufficiently so to scorch or injure the paper. The obliterated picture immediately reappears, not blue, but brown. If kept for some weeks in this state between the leaves of a portfolio, in complete darkness, it fades, and at length almost entirely disappears. But what is very singular, a fresh application of the heat revives and restores it to its full intensity.

"This curious transformation is instructive in another way. It is not operated on by light. At least not by light alone. *A certain temperature* must be attained and that temperature suffices in total darkness. Nevertheless, I find that on exposing to a very concentrated spectrum (collected by a lens of short focus) a slip of paper duly prepared as above (that is to say by washing with the mixed solutions, exposure to sunshine, washing, discharging the uniform blue color so induced as in the last article) its whiteness is changed to brown over the whole region of the red and orange rays, *but not beyond* the luminous spectrum. Three conclusions seem unavoidable:—1st, that it is the heat of these rays, not their light, which operates the change; 2ndly, that this heat possesses a peculiar chemical quality which is not possessed by the purely calorific rays outside of the visible spectrum, though far more intense; and, 3rdly, that the heat radiated from obscurely hot iron abounds especially in rays analogous to those of the region of the spectrum above indicated."

Sir John Herschel then proceeds to show that whatever be the state of the iron in the double salts in question, its reduction by blue light to the state of protoxide is indicated by many other re-agents. Thus, for example, if a slip of paper prepared with the ammonio-citrate of iron be exposed partially to sunshine, and then washed with the bichromate of potash, the bichromate is deoxidized, and precipitated upon the sunned portion, just as it would be if directly exposed to the sun's rays.

I have proved this fact with a great number of preparations of cobalt, nickel, bismuth, platinum, and other salts which have been thought hitherto to be insensible to

solar agency; but if they are partially sunned, and then washed with nitrate of silver, and put aside in the dark, the metallic silver is slowly reduced upon the sunned portion. In many instances days were required to produce the visible picture; and in one case, paper, being washed with neutral chloride of platinum, was sunned, and then washed in the dark with nitrate of silver; it was some weeks before the image made its appearance, but it was eventually perfectly developed, and, when quite so, remained most permanently impressed upon the paper.

A process of an analogous character to that which has just been described, and in which the chloride of gold is an agent, must be next described: this was discovered at the same time as the cyanotype, and has been termed the chrysotype.

CHRYSTYPE.—In order to ascertain whether any portion of the iron in the double ammoniacal salt employed had really undergone deoxidation, and become reduced to the state of protoxide as supposed, I had recourse to a solution of gold, exactly neutralized by carbonate of soda. The proto-salts of iron, as is well known to chemists, precipitate gold in the metallic state. The effect proved exceedingly striking, issuing in a process no wise inferior in the almost magical beauty of its effect to the calotype process of Mr. Talbot, which in some respects it nearly resembles, with this advantage, as a matter of experimental exhibition, that the disclosure of the dormant image does not require to be performed in the dark, being not interfered with by moderate daylight. As the experiment will probably be repeated by others, I shall here describe it *ab initio*. Paper is to be washed with a moderately concentrated solution of ammonio-citrate of iron, and dried. The strength of the solution should be such as to dry into a good yellow color, not at all brown. In this state it is ready to receive a photographic image, which may be impressed on it either from nature in the camera-obscura, or from an engraving on a frame in sunshine. The image so impressed however, is very faint, and sometimes hardly perceptible. The moment it is removed from the frame or camera, it must be washed over with a neutral solution of gold of such strength as to have about the color of sherry wine. In-

stantly the picture appears, not, indeed, at once of its full intensity, but darkening with great rapidity up to a certain point, depending on the strength of the solutions used, &c. At this point nothing can surpass the sharpness and perfection of detail of the resulting photograph. To arrest this process and to fix the picture (so far at least as the further agency of *light* is concerned), it is to be thrown into water very slightly acidulated with sulphuric acid, and well soaked, dried, washed with hydrobromate of potash, rinsed, and dried again.

Such is the outline of a process to which I propose applying the name of *Chrysotype*, in order to recall, by similarity of structure and termination, the *Calotype* process of Mr. Talbot, to which, in its general effect it affords so close a parallel. Being very recent, I have not yet (June 10, 1842) obtained a complete command over all its details, but the termination of the session of the Society being close at hand, I have not thought it advisable to suppress its mention. In point of *direct* sensibility, the chrysotype paper is certainly inferior to the calotype; but it is one of the most remarkable peculiarities of gold as a photographic ingredient, that *extremely feeble impressions once made by light go on afterwards darkening spontaneously and very slowly, apparently without limit, so long as the least vestige of unreduced chloride of gold remains in the paper*. To illustrate this curious and (so far as applications go) highly important property, I shall mention incidentally the results of some experiments made, during the late fine weather, on the habitudes of gold in presence of oxalic acid. It is well known to chemists that this acid heated with solutions of gold, precipitates the metal in its metallic state; it is upon this property that Berzelius has founded his determination of the atomic weight of gold. Light, as well as heat, also operates this precipitation; but to render it effectual, several conditions are necessary:—1st, the solution of gold must be neutral, or at most *very* slightly acid; 2nd, the oxalic acid must be added in the form of a neutral oxalate; and 3rdly, it must be present in a certain considerable quantity, which quantity must be greater the greater the amount of free acid present in the chloride. Under these

conditions, the gold is precipitated by light as a black powder if the liquid be in any bulk, and if merely washed over paper a stain is produced, which, however feeble at first, under a certain dosage of the chloride, oxalate, and free acid, goes on increasing from day to day and from week to week, when laid by in the dark, and especially in a damp atmosphere, till it acquires almost the blackness of ink; the unsunned portion of the paper remaining unaffected, or so slightly as to render it almost certain that what little action of the kind exists is due to the effect of casual dispersed light incident in the preparation of the paper. I have before me a specimen of paper so treated in which the effect of thirty seconds' exposure to sunshine was quite invisible at first, and which is now of so intense a purple as may well be called black, while the unsunned portion has acquired comparatively but a very slight brown. And (which is not a little remarkable, and indicates that in the time of exposure mentioned the *maximum* of effect was attained) other portions of the same paper exposed in graduated progression for longer times, viz. 1 min., 2 min., and 3 min., are not in the least perceptible degree darker than the portion on which the light had acted during thirty seconds only.

If paper be prepared as above recommended for the chrysotype, either with the ammonio-citrate or ammonio-tartrate of iron, and impressed, as in that process, with a latent picture, be washed with nitrate of silver instead of a solution of gold, a very sharp and beautiful picture is developed, of great intensity. Its disclosure is not instantaneous; a few moments elapse without apparent effect; the dark shades are then first touched in, and by degrees the details appear, but much more slowly than in the case of gold. In two or three minutes, however, the maximum of distinctness will not fail to be attained. The picture may be fixed by the hyposulphite of soda, which alone, I believe, can be fully depended on for fixing argentine photographs.

The best process for fixing any of the photographs prepared with gold is as follows;—As soon as the picture is satisfactorily brought out by the auriferous fluid, it is to be rinsed in spring water, which must be three times renewed, letting it re-

main in the third water five or ten minutes. It is then to be blotted off and dried, after which it is to be washed on both sides with a somewhat weak solution of hydriodate of potash. If there be any free chloride of gold present in the pores of paper, it will be discolored, the lights passing to a ruddy brown; but they speedily whiten again spontaneously, or at all events, on throwing it (after lying a minute or two) into fresh water, in which, being again rinsed and dried, it is now perfectly fixed.

PHOTOGRAPHIC PROPERTIES OF MERCURY.—As an agent in the daguerreotype process, it is not, strictly speaking, photographically affected. It operates there only in virtue of its readiness to amalgamate with silver properly prepared to receive it. That it possesses *direct* photographic susceptibility, however, in a very eminent degree, is proved by the following experiment. Let a paper be washed over with a weak solution of periodide of iron, and, when dry, with a solution of proto-nitrate of mercury. A bright yellow paper is produced, which (if the right strength of the liquids be hit) is exceedingly sensitive while wet, darkening to a brown color in a very few seconds in the sunshine. Withdrawn, the impression fades rapidly, and the paper in a few hours recovers its original color. In operating this change of color, the whole spectrum is effective, with the exception of the thermic rays beyond the red.

Proto-nitrate of mercury simply washed over paper is slowly and feebly blackened by exposure to sunshine. And if paper be impregnated with the ammonio-citrate of iron, already so often mentioned, partially sunned, and then washed with the proto nitrate, a reduction of the latter salt, and consequently blackening of the paper, takes place very slowly in the dark over the sunned portion, to nearly the same amount as in the direct action of the light on the simply nitrated paper.

But if the mercurial salt be subjected to the action of light in contact with the ammonio-citrate, or tartrate, the effect is far more powerful. Considering, at present, only the citric double salt, a paper prepared by washing first with that salt and then with the mercurial proto-nitrate (drying between) is endowed with considerable sensibility, and darkens to a very deep

brown, nay, to complete blackness, on a moderate exposure to good sun. Very sharp and intense photographs of a negative character may be thus taken. They are, however, difficult to *fix*. The only method which I have found at all to succeed has been by washing them with bichromate of potash and soaking them for twenty four-hours in water, which *dissolves out* the chromate of mercury for the most part; leaving, however, a yellow tint on the ground, which resists obstinately. But though pretty effectually fixed in this way against *light*, they are not so against *time*, as they fade considerably on keeping.

When the proto-nitrate of mercury, is mixed, in solution, with either of the ammoniacal double salts, it forms a precipitate, which, worked up with a brush to the consistence of cream, and spread upon paper, produces very fine pictures, the intensity of which it is almost impossible to go beyond. Most unfortunately, they cannot be preserved. Every attempt to fix them has resulted in the destruction of their beauty and force; and even when kept from light, they fade with more or less rapidity, some disappearing almost entirely in three or four days, while others have resisted tolerably well for a fortnight, or even a month. It is to an over-dose of tartaric acid that their more rapid deterioration seems to be due, and of course it is important to keep down the proportion of this ingredient as low as possible. But without it I have never succeeded in producing that peculiar velvety aspect on which the charm of these pictures chiefly depends, nor anything like the same intensity of color without over-sunning.

Extending his inquiries still further into these remarkable changes, the following process presented itself, which is in many respects remarkable.

If nitrate of silver, specific gravity 1.200, be added to the ferro-tartaric acid, specific gravity 1.023 a precipitate falls, which is in great measure re-dissolved by a gentle heat, leaving a black sediment, which being cleared by subsidence, a liquid of a pale yellow color is obtained, in which a further addition of the nitrate causes no turbidness. When the total quantity of the nitrated solution added amounts to about half the bulk of the ferro-tartaric

acid, it is enough. The liquid so prepared does not alter by keeping in the dark.

Spread on paper, and exposed wet to the sunshine (partly shaded) for a few seconds, no impression seems to have been made; but by degrees (although withdrawn from the action of the light) it develops itself spontaneously, and at length becomes very intense. But if the paper be thoroughly dried in the dark (in which state it is of a very pale greenish-yellow color), it possesses the singular property of receiving a dormant or invisible picture to produce which, (if it be, for instance, an engraving that is to be copied), from thirty seconds to a minute's exposure in the sunshine is requisite. It should not be continued too long, as not only is the ultimate effect less striking, but a picture begins to be visibly produced, which darkens spontaneously after it is withdrawn. But if the exposure be discontinued before this effect comes on, an invisible impression is the result, to develop which all that is necessary is to breathe upon it, when it immediately appears, and very speedily acquires an extraordinary intensity and sharpness, as if by magic. Instead of the breath, it may be subjected to the regulated action of aqueous vapor by laying it in a blotting-paper book, of which some of the outer leaves on both sides have been damped, or by holding it over warm water.

Many preparations, both of silver and gold, possess a similar property in an inferior degree, but none that I have yet met with to anything like the extent of that above described.

These pictures do not admit of being permanently fixed; they are so against the action of light, but not against the operations of time. They slowly fade out, even in the dark; and in some examples which I have prepared, the remarkable phenomenon of a restoration after fading, but with reversed lights and shades, has taken place.

The results obtained by Sir John Herschel on the coloring juices of flowers are too remarkable to be omitted in a treatise in which it is desirable that every point should be registered up to the date of publication, which connects itself with the phenomena of chemical change applied to photography.

OF THE COLORS OF FLOWERS IN GENERAL.—In operating on the colors of flowers I have usually proceeded as follows :—The petals of the fresh flowers, or rather such parts of them as possessed a uniform tint were crushed to a pulp in a marble mortar, either alone, or with addition of alcohol, and the juice expressed by squeezing the pulp in a clean linen or cotton cloth. It was then spread on paper with a flat brush, and dried in the air without artificial heat, or at most with the gentle warmth which rises in the ascending current of air from an Arnott stove. If alcohol be not added, the application on paper must be performed immediately, since exposure to the air of the juices of most flowers (in some cases even for but a few minutes) irrecoverably changes or destroys their color. If alcohol be present, this change does not usually take place or is much retarded; for which reason, as well as on account of certain facilities afforded by its admixture in procuring an even tint (to be presently stated), this addition was commonly, but not always, made.

Most flowers give out their coloring matter readily enough, either to alcohol or water. Some, however, as the *Escholzas* and *Calceolarias*, refuse to do so, and require the addition of alkalis, others of acids, &c. When alcohol is added, it should, however, be observed that the tint is often apparently much enfeebled, or even discharged altogether, and that the tincture when spread on paper, does not reappear of its due intensity till after complete drying. The temporary destruction of the color of the blue heartsease by alcohol has been noticed in my former paper (Art. 90), nor is that by any means a singular instance. In some, but in very few cases, it is destroyed, so as neither to reappear on drying, nor to be capable of revival by any means tried. And in all cases long keeping deteriorates the colors and alters the qualities of the alcoholic tinctures themselves, so that they should always be used as fresh as possible.

If papers tinged with vegetable colors are intended to be preserved, they must be kept perfectly dry and in darkness. A close tin vessel, the air of which is dried by quicklime (carefully enclosed in double paper bags well pasted at the edges to prevent the dust escaping), is useful for this

purpose. Moisture (as already mentioned, especially assisted by heat) destroys them for the most part rapidly, though some (as the color of the *Senecio splendens*) resist obstinately. Their destructibility by this agency, however, seems to bear no distinct relation to their photographic properties.

This is also the place to observe that the color of a flower is by no means always or usually, that which its expressed juice imparts to white paper. In many cases the tints so imparted have no resemblance to the original hue. Thus, to give only a few instances, the red damask rose of that intense variety of color, commonly called by florists the black rose, gives a dark slate blue, as do also the clove carnation and the black hollyhock; a fine dark brown variety of sparaxis gave a dull olive green; and a beautiful rose colored tulip, a dirty blueish green; but perhaps the most striking case of this kind is that of a common sort of red poppy (*Papaver Rheum*), whose expressed juice imparts to paper a rich and most beautiful blue color, whose elegant properties as a photographic material will be further alluded to hereafter.*

This change of color is probably owing to different causes in different flowers. In some it undoubtedly arises from the escape of carbonic acid, but this as a general cause for the change from red to blue, has, I am aware, been controverted. In some (as is the case with the yellow ranunculi) it seems to arise from a chemical alteration depending on absorption of oxygen; and in others, especially where the expressed juice coagulates on standing, to a loss of vitality or disorganization of the molecules. The fresh petal of a single flower merely crushed by rubbing on dry paper, and instantly dried, leaves a stain much more nearly approximating to the original hue. This, for example, is the only way in which the fine blue color of the common field veronica can be imparted to paper. Its expressed juice, however quickly prepared, when laid on with a brush, affords only a dirty neutral gray, and so of many others. But in this way no even

* A semicultivated variety was used, having dark purple spots at the bases of the petals. The common red poppy of the chalk (*Papaver hybridum*) gives a purple color much less sensitive and beautiful.

tint can be had, which is a first requisite to the experiments now in question, as well as to their application to photography.

To secure this desirable evenness of tint the following manipulation will generally be found successful:—The paper should be moistened at the back by sponging and blotting off. It should then be pinned on a board, the moist side downwards, so that two of its edges (suppose the right-hand and lower ones) shall project a little beyond those of the board. The board being then inclined twenty or thirty degrees to the horizon, the alcoholic tincture (mixed with a very little water, if the petals themselves be not very juicy) is to be applied with a brush in strokes from left to right, taking care *not* to go over the edges which rest on the board but *to* pass clearly over those which project, and observing also to carry the tint from below upwards by quick sweeping strokes, leaving no dry spaces between them, but keeping up a continuity of wet surface. When all is wet, cross them by another set of strokes from above downward, so managing the brush as to leave no floating liquid on the paper. It must then be dried as quickly as possible over a stove, or in a current of warm air; avoiding, however, such heat as may injure the tint. The presence of alcohol prevents the solution of the gummy principle, which, when present, gives a smeary surface; but the evenness of tint given by this process results chiefly from that singular intestine movement which always takes place when alcohol is in the act of separation from water by evaporation—a movement which disperses knots and blots in the film of liquid with great energy, and spreads them over the surrounding surface.

CORCHORUS JAPONICA.—The flowers of this common and hardy but highly ornamental plant, are of a fine yellow, somewhat inclining to orange, and this is also the color the expressed juice imparts to paper. As the color begins to fade *the petals whiten*,—an indication of their photographic sensibility, which is amply verified on exposure of the stained paper to sunshine. I have hitherto met with no vegetable color so sensitive. If the flowers be gathered in the height of their season, paper so colored (which is of very even and beautiful yellow) begins to discolor in ten or twelve minutes in clear sun-

shine, and in half an hour is completely whitened. The color seems to resist the first impression of the light, as if by some remains of vitality, which being overcome, the tint gives way at once, and the discoloration, when commenced, goes on rapidly. *It does not even cease in the dark when once begun.* Hence it happens that photographic impressions taken on such paper, which, when fresh, are very sharp and beautiful, fade by keeping, visibly from day to day, however carefully preserved from light. They require from half an hour to an hour to complete, according to the sunshine. Hydriodate of potash cautiously applied retards considerably, but does not ultimately prevent, this spontaneous discharge.

COMMON TEN WEEKS' STOCKS. MATHIOLA ANNUA.—Paper stained with the tincture of this flower is changed to a vivid scarlet by acids, and to green by alkalies; if ammonia be used the red color is restored as the ammonia evaporates, proving the absence of any acid quality in the coloring matter sufficiently energetic to coerce the elastic force of the alkaline gas. Sulphurous acid whitens it, as do the alkaline sulphites; but this effect is transient, and the red color is slowly restored by free exposure to the air, especially with the aid of light, whose influence in this case is the more remarkable, being exactly the reverse of its ordinary action on this coloring principle, which it destroys irrecoverably, as above stated. The following experiments were made to trace and illustrate this curious change:—

Two photographic copies of engravings taken on paper tinted with this color were placed in a jar of sulphurous acid gas, by which they were completely whitened, and all traces of the pictures obliterated. They were then exposed to free air, the one in the dark, the other in sunshine. Both recovered, but the former much more slowly than the latter. The restoration of the picture exposed to sun was completed in twenty-four hours, that in the dark not till after a lapse of two or three days.

A slip of the stained paper was wetted with liquid sulphurous acid and laid on blotting-paper similarly wetted. Being then crossed with a strip of black paper, it was laid between glass plates and (evaporation of the acid being thus prevented)

was exposed to full sunshine. After some time the red color (in spite of the presence of the acid) was considerably restored in the portion exposed, while the whole of the portion covered by the black paper remained (of course) perfectly white.

Slips of paper, stained as above, were placed under a receiver, beside a small capsule of liquid sulphurous acid. When completely discolored they were subjected (on various occasions, and after various lengths of exposure to the acid fumes from half an hour to many days) to the action of the spectrum; and it was found, as indeed I had expected, that *the restoration of color was operated by rays complementary to those which destroy it in the natural state of the paper*; the violet rays being chiefly active, the blue almost equally so, the green little, and the yellow, orange, and most refrangible red not at all. In one experiment a pretty well-defined red solar image was developed by the *least* refrangible red rays also, being precisely those for which in the unprepared paper the discoloring action is abruptly cut off. But this spot I never succeeded in reproducing; and it ought also to be mentioned, that, according to differences in the preparation not obvious, the degree of sensibility, generally, of the bleached to the restorative action of light differed greatly; in some cases a perceptible reddening being produced in ten seconds, and a considerable streak in two minutes, while in others a very long time was required to produce any effect.

The dormancy of this coloring principle under the influence of sulphurous acid, is well shown by dropping a little weak sulphuric acid on the paper bleached by that gas, which immediately restores the red color in all its vigor. In like manner alkalies restore the color, converting it at the same time into green.

PAPAYER ORIENTALE.—The chemical habitudes of the sulphurous acid render it highly probable that its action, in inducing a dormant state of the calorific principle, consists in a partial deoxidisement, unaccompanied, however, with disorganization of its molecules. And this view is corroborated by the similar action of alcohol already spoken of; similar, that is, in kind, though less complete in degree. Most commonly, vegetable colors, weakened by

the action of alcohol, are speedily restored on the total evaporation of that ingredient. But one remarkable instance of absolute dormancy induced by that agent, has occurred to me in the case of the *Papaver orientale*, a flower of vivid orange color, bordering on scarlet, the coloring matter of which is not extractable otherwise than by alcohol, and then only in a state so completely masked as to impart no more than a faint yellowish or pinkish hue to paper, which it retains when thoroughly dry, and apparently during any length of time without perceptible increase of tint. If at any time, however, a drop of weak acid be applied to paper prepared with this tincture, a vivid scarlet color is immediately developed; thus demonstrating the continued though latent existence of the coloring principle. On observing this, it occurred to me to enquire whether, in its dormant state, that principal still retained its susceptibility of being acted on by light since the same powerful and delicate agent which had been shown, in so many cases as to constitute a general law, capable of disorganizing and destroying vegetable colors actually developed, might easily be presumed competent to destroy the capacity for assuming color, in such organic matter as might possess it, under the influence of their otherwise appropriate chemical stimuli. A strip of the paper was therefore exposed for an hour or two to the spectrum, but without sensible effect, the whole surface being equally reddened by an acid. As this experiment sufficiently indicated the action of light, if any, to be very slow, I next placed a strip, partly covered, in a south-east window, where it remained from June 19 to August 19, receiving the few and scanty sunbeams which that interval of the deplorable summer of 1841 afforded. When removed, the part exposed could barely be distinguished from the part shaded, as a trifle yellower. But on applying acid, the exposed and shaded portions were at once distinguished by the assumption of a vivid red in the latter, the former remaining unchanged.

A mezzotinto picture was now pressed on a glazed frame over another portion of the same paper, and abandoned on the upper shelf of a green-house to whatever sun might occur from August 19 to October 19. The interval proved one of almost

uninterrupted storm, rain, and darkness. On removal, no appearance whatever of any impressed picture could be discerned, nor was it even possible to tell the top of the picture from the bottom. It was then exposed in a glass jar to the fumes of muriatic acid, when, after a few minutes, the development of the dormant picture commenced, and slowly proceeded, disclosing the details in a soft and pleasing style. Being then laid by in a drawer, with free access of air, the picture again faded, by very slow degrees, and on January 2, 1842, was found quite obliterated. Being then subjected to the acid vapor the color was reproduced.

VIOLA ODORATA.—Chemists are familiar with the color of this flower as a test of acids and alkalies, for which, however, it seems by no means better adapted than many others; less so, indeed, than that of the *Viola tricolor*, the common purple iris, and many others which might be named. It offers, in fact, another, and rather a striking instance of the simultaneous existence of two coloring ingredients in the same flower comporting themselves differently, not only in regard to light but to chemical agents. Extracted with alcohol, the juice of the violet is of a rich blue color, which it imparts in high perfection to paper. Exposed to sunshine, a portion of this color gives way pretty readily, but a residual blue, rather inclining to greenish, resists obstinately, and requires a very much longer exposure (for whole weeks indeed) for its destruction, which is not even then complete. Photographic impressions, therefore, taken on this paper, though very pretty, are exceedingly tedious in their preparation, if we would have the lights sharply made out.

SPARAXIS TRICOLOR? VAR.—**STIMULATING EFFECTS OF ALKALIES.**—Among a great many hybrid varieties of this genus, lately forwarded to me from the Cape, occurred one of a very intense purplish brown color, nearly black. The alcoholic extract of this flower in its liquid state is rich crimson brown. Spread on paper it imparted a dark olive green color, which proved perfectly insensible to very prolonged action, either of sunshine or the spectrum. The addition of carbonate of soda changed the color of this tincture to a good green, slightly inclining to olive, and which

imparted the same tint to paper. In this state to my surprise, it manifested rather a high degree of photographic sensibility, and gave very pretty pictures with a day or two of exposure to sunshine. When prepared with the fresh juice there is hardly any residual tint, but if the paper be kept, a great amount of indestructible yellow remains outstanding. The action is confined chiefly to the negative end of the spectrum, the maximum being at -8.0 , and the sensible limits of the impression (corrected for semidiameter) being -11.0 and 56.4 of which, however, all but the first five or six parts beyond the fiducial yellow show little more than a trace of action. A photograph impressed on this paper is reddened by muriatic acid fumes. If then transferred to an atmosphere of ammonia, and when saturated the excess of alkali allowed to exhale, it is fixed, and of a dark green color. Both the tint and sharpness of the picture, however, suffer in this process.

RED POPPY.—PAPAVER RHEUM?—Among the vegetable colors totally destroyed by light, or which leave no residual tint, at least when fresh prepared, perhaps the two most rich and beautiful are those of the red poppy, and the double purple groundsel (*Senecio splendens*). The former owes its red color in all probability to free carbonic acid, or some other, (as the acetic) completely expelled by drying; for the color its tincture imparts to paper, instead of red is a fine blue, very slightly verging on slate-blue. But it has by no means the ordinary chemical characters of blue vegetable colors. Carbonate of soda, for instance, does not in the least degree turn the expressed juice green; and when washed with the mixture, a paper results of a light slate-gray, hardly at all inclining to green. The blue tincture is considerably sensitive, and from the richness of its tone and the absence of residual tint, paper stained with it affords photographic impressions of great beauty and sharpness, some of which will be found among the collection submitted with this paper for inspection.

SENECIO SPLENDENS.—This flower yields a rich purple juice in great abundance and of surprising intensity. Nothing can exceed the rich and velvety tint of paper tinted while it is fresh. It is, how-

ever, not very sensible to light, and many weeks are necessary to obtain a good photographic impression.

In the progress of my own researches on this subject, I found that the green coloring matter of the leaves of herbaceous plants, when spread upon paper, changed with tolerable rapidity when exposed to sunshine. There are, however, some very curious points connected with the phenomena of these changes which demand a far more extensive investigation than they have yet received.

I find that the juices taken from the leaves in the spring, change more rapidly than when expressed from the same plants in the autumn; and the juices of those flowering plants which have been cultivated under the artificial circumstances of a store-house, or conservatory, are more readily effected than such as are grown in the open air. Many of the experiments just described furnish very instructive examples of the operations of the solar rays upon organic bodies from which we may deduce important truths connected with natural phenomena.

CHAPTER XI.

MISCELLANEOUS PROCESSES.

There are many preparations which are affected by light in a similar manner to the salts of silver. Several have been tried as photographic materials, but as yet without much success, with the exception of the bichromate of potash, which was first announced as a useful photographic agent, by Mr. Mungo Ponton, in the *Edinburgh New Philosophical Journal*; from which I quote Mr. Ponton's own account.

When paper is immersed in the bichromate of potash, it is powerfully and rapidly acted on by the sun's rays. When an object is laid in the usual way on this paper, the portion exposed to the light speedily becomes tawny, passing more or less into a deep orange, according to the strength of the light. The portion covered by the object retains the original bright yellow tint which it had before exposure, and the object is thus represented yellow upon an orange ground, there being several gradations of shade or tint, according to the greater or less degree of transparency in the different parts of the object.

In this state, of course, the drawing, though very beautiful, is evanescent. To fix it, all that is required is careful immersion in water, when it will be found that those portions of the salt which have not been acted on by the light are readily dissolved out, while those which have been exposed to the light are completely fixed on the paper. By the second process the object is obtained white upon an orange ground, and quite permanent. If exposed for many hours together to strong sunshine, the color of the ground is apt to lose in depth, but not more so than most other coloring matters. This action of light on the bichromate of potash differs from that upon the salts of silver. Those of the latter which are blackened by light, are of themselves insoluble in water, and it is difficult to impregnate paper with them, in a uniform manner. The blackening seems to be caused by the formation of oxide of silver.

In the case of the bichromate of potash, again, that salt is exceedingly soluble, and paper can be easily saturated with it. The agency of light not only changes its color, but deprives it of solubility, thus rendering it fixed in the paper. This action appears to consist in the disengagement of free chromic acid, which is of a deep red color, and which seems to combine with the paper. This is rendered more probable from the circumstance that the neutral chromate exhibits no similar change. The best mode of preparing paper with bichromate of potash is to use a saturated solution of that salt; soak the paper well in it, and then dry it rapidly at a brisk fire, excluding it from daylight. Paper thus prepared acquires a deep orange tint on exposure to the sun. If the solution be less strong, or the drying less rapid, the color will not be so deep. A pleasing variety may be made by using sulphate of indigo along with the bichromate of potash, the color of the object and of the paper being then different shades of green. In this way also the object may be represented of a darker shade than the ground.

Paper prepared with the bichromate of potash, though as sensitive as some of the papers prepared with the salts of silver, is much inferior to most of them, and is not sufficiently sensitive for the camera-obscura. This paper, however, answers quite

well for taking drawings from dried plants, or for copying prints. Its great recommendation is its cheapness, and the facility with which it can be prepared. The price of the bichromate of potash is about two shillings per pound, whilst the nitrate of silver is five shillings the ounce.

As the deep orange ground of these pictures prevents the permeation of the chemical rays of light, it is very easy to procure any number of fac similies of an engraving, by transfer from the first negative photograph. The correct copies have a beautiful sharpness, and, if carefully managed, but little of the minute detail of the original engraving is lost.

The most interesting kind of photographic paper prepared with the bichromate of potash is a kind described by M. E. Becquerel. He states,—It is sufficient to steep a paper prepared in Mr. Ponton's manner, and upon which there exists a faint copy of a drawing in a solution of iodine in alcohol, to wash this paper in alcohol, and then dry it; then the parts which were white become blue, and those which were yellow remain more or less clear.

M. E. Becquerel has pursued his investigations into the action of the chromic acid on organic compounds, and has shown that the mode of sizing the papers influences their coloration by light, and that with unsized paper coloration is effected only after a long time. Perceiving that the principal reaction resulted from the chromic acid contained in the bichromate of potash, on the starch in the size of paper, it occurred to M. E. Becquerel, that, as starch has the property of forming with iodine a combination of a very fine blue color, it should produce deep shades of that tint, whilst the lights still remained an orange-yellow.

His method of proceeding is to spread a size of starch very uniformly over the surface of the paper. It is then steeped in a weak alcoholic solution of iodine, and afterwards washed in a great quantity of water. By this immersion it should take a very fine blue tint. If this is uniform, the paper is considered fit for the experiment: in the contrary case it is sized again. It is then steeped in a concentrated solution of bichromate of potash, and pressed between folds of blotting paper, and dried near the fire. To be effective, it should be very dry.

It is now fit for use. When the copy is effected, which requires in sunshine about five minutes, the photograph is washed and dried. When dry, it is steeped in a weak alcoholic solution of iodine, and afterwards, when it has remained in it some time, it is washed in water, and carefully dried with blotting paper, but not at the fire, for a little below 100° Fahr. the combination of iodine and starch discolors.

If it be considered that the drawing is not sufficiently distinct, this immersion may be repeated several times; for by this means may be obtained the intensity of tone that is desired, which intensity can be changed at will by employing a more concentrated solution of iodine.

When the paper is damp, the shades are of a very fine blue, but when it is dry the color becomes deep violet. If while the drawing is still wet it be covered with a layer of gum arabic, the color of the drawing is greatly preserved, and more beautiful when it is dry. When a paper is thus prepared it loses at first a little of its tone, but it afterwards preserves its violet tint.

THE CHROMATYPE.—This process, devised by the author, is a pleasing one in its results; it is exceedingly simple in its manipulatory details, and produces very charming positive pictures by the first application.

The chromatype is founded on the above process of Mr. Ponton's, but it was found in practice that the bichromate of potash alone would not produce the desired effect: the following method was therefore adopted:—

One drachm of sulphate of copper is dissolved in an ounce of distilled water, to which is added half an ounce of a saturated solution of bichromate of potash; this solution is applied to the surface of the paper, and, when dry, it is fit for use, and may be kept for any length of time without spoiling. When exposed to sunshine, the first change is to a dull brown, and if checked in this stage of the process we get a negative picture, but if the action of the light is continued, the browning gives way, and we have a positive yellow picture on a white ground. In either case, if the paper, when removed from the sunshine, is washed over with a solution of nitrate of silver, a very beautiful positive picture re-

sults. In practice, it will be found advantageous to allow the bleaching action to go on to some extent; the picture resulting from this will be clearer and more defined than that which is procured when the action is checked at the brown stage. To fix these pictures it is necessary to remove the nitrate of silver, which is done by washing in *pure* water; if the water contains any muriates the picture suffers, and long soaking in such water obliterates it, or if a few grains of common salt are added to the water the apparent destruction is very rapid. The picture is, however, capable of restoration; all that is necessary being to expose it to sunshine for a quarter of an hour, when it revives; but instead of being of a red color, it becomes lilac, the shades of color depending upon the quality of salt used to decompose the chromate of silver which forms the shadow parts of the picture.

Mr. Bingham remarks on this process, that if we substitute sulphate of nickel for the sulphate of copper, the paper is more sensitive and the picture is more clearly developed by nitrate of silver.

The following modification of this process possesses some advantages. If to a solution of the sulphate of copper we add a solution of the neutral chromate of potash, a very copious brown precipitate falls, which is a true chromate of copper. If this precipitate, after being well washed, is added to water acidulated with sulphuric acid, it is dissolved, and a bichromatic solution is formed, which, when spread upon paper, is of a pure yellow. A very short exposure of the papers washed with this solution is quite sufficient to discharge all the yellow from the paper, and give it perfect whiteness. If an engraving is to be copied we proceed in the usual manner; and we may either bring out the picture by placing the paper in a solution of carbonate of soda or potash, by which all the shadows are represented by the chromate of copper, or by washing the paper with nitrate of silver. It may sometimes happen that, owing to deficient light, the photograph is darkened all over when the silver is applied: this color, by keeping, is gradually removed, and the picture comes out clear and sharp.

If the chromate of copper is dissolved in ammonia, a beautiful green solution results,

and if applied to paper they act similarly to those just described.

The chromatype pictures, under certain conditions, afford a beautiful example of the changes which take place, slowly, in the dark, from the combined operations of materials employed.

If we take a chromatype picture after it has been developed by the agency of either nitrate of silver, or of mercury, and place it aside in the dark, it will be found, after a few weeks, to have darkened considerably both in the lights and shadows. This darkening slowly increases, until eventually the picture is obliterated beneath a film of metallic silver or mercury; but, while the picture has been fading out on one side, it has been developing itself on the other, and a very pleasing image is seen on the back. After some considerable time the metal on the front gives way again, the paper slowly whitens, and eventually the image is presented on both sides of the paper of equal intensity, in a good neutral tint upon a grey ground.

On the Use of the Salts of Gold as Photographic Agents.

It is well known that gold is revived from its ethereal solution by the action of light, and that the same effect takes place when the nitro-muriate of gold is spread on charcoal.

Considering it probable that the required unstable equilibrium might be induced in some of the salts of gold, I was induced to pursue a great many experiments on this point. In some cases, where the paper was impregnated with a mordant salt, the salt of gold was darkened rapidly, without the assistance of light; in others, the effect of light was very slow and uncertain. By washing paper with muriate of barytes, and then with a solution of the chloride of gold, a paper, having a slight pinky tint, is procured; by exposing this paper to sunshine it is at first *whitened*, and then, but very slowly, a darkening action is induced. If, however, we remove the paper from the light, after an exposure of a few minutes, when a very faint impression, and oftentimes, not any, is apparent, and hold it in the steam of boiling water, or immerse it in cold water, all the parts which were exposed to the light are rapidly darkened to a full purple brown, leaving the covered

portions on which the light has not acted, a pure white, producing thus a fine negative drawing. If, while such a paper, or any other paper prepared with the chloride of gold, is exposed to the sun, we wash it with a weak solution of the hydriodate of potash, the oxidation is very rapidly brought on, and the darkness produced is much greater than that obtained by the other method; but this plan is not often applicable. I have not yet been enabled to produce with the salts of gold any paper which should be sufficiently sensitive for use in the camera-obscura.

Sir John Herschel devoted much attention to the examination of the salts of gold and platinum. He found platina under nearly all circumstances very little sensitive to light, but the following were the results obtained with the salts of gold.

If paper impregnated with oxalate of ammonia be washed with chloride of gold, it becomes, if certain proportions be hit, pretty sensitive to light; passing rather rapidly to a violet purple in the sun. It passes also to the same purple hue in the dark, though much more slowly; so that, as a photographic combination, it is useless.

Paper impregnated with acetate of lead, when washed with perfectly neutral chloride of gold, acquires a brownish yellow hue, and a sensibility to light, which though not great, is attended with some peculiarities highly worthy of notice. The first impression of the solar rays seems rather to whiten than to darken the paper, by discharging the original color, and substituting for it a pale greyish tint, which by slow degrees increases to a dark slate color. But if arrested while yet not more than a moderate ash grey, and held in a current of steam, the color of the part acted on by the sunshine, and that only, darkens immediately to a dark purple. The same effect is produced by immersing it in boiling water. If plunged in cold water, the same change comes on more slowly, and is not complete till the paper is dried by heat. A *dry heat*, however, does not operate this singular change.

If a neutral solution of the chloride of gold is mixed with an equal quantity of the solution of bichromate of potash, paper washed with this solution, and exposed to light, speedily changes, first to a deep

brown, and ultimately to a bluish black. If an engraving is superposed, we have a negative copy, blue, or brown, upon a yellow ground. If this photograph is placed in clean water, and allowed to remain in it for some hours, very singular changes take place. The yellow salt is all dissolved out, and those parts of the paper left beautifully white. All the dark portions become more decided in their character, and according as the solarization has been prolonged or otherwise, or the light has been more or less intense, we have either crimson, blue, brown, or deep black negative photographs.

THE ENERGIATYPE OR FERROTYPE.

This process, which is of remarkable sensibility, was discovered by the author, and published in the *Athenæum*. The preparation of the paper is as follows:—Good letter paper (Whatman's is the best), is washed over with the following solution viz.: Five grains of succinic acid (it is important that succinic free from any oil of amber, or adventitious matter, should be obtained) are to be dissolved in one fluid ounce of water, to which is added about five grains of common salt, and half a drachm of mucilage of gum arabic. When dry, the paper is drawn over the surface of a solution of sixty grains of nitrate of silver in one ounce of distilled water. Allowed to dry in the dark, the paper is now fit for use, is of a pure white, retains its color, and may be preserved for a considerable time in a portfolio, until wanted for use.

The preparation of this paper is by no means difficult, but requires care and attention. The solutions must be applied very equally over the paper, which should be immediately hung upon a frame or clothes' horse to dry. Extreme care must be taken that the paper be not exposed to light, after the nitrate of silver solution has been applied until required for use. Many of the disappointments experienced by the experimenters on the energiatype are occasioned by a neglect of this precaution; as, although no apparent effect may have been produced by the exposure, the clearness of the subsequent picture will be seriously injured. The succinic acid must also be very pure. We shall now briefly describe the method of applying the energiatype to

the different purposes for which it is best adapted, premising that the various circumstances of time, place, and light, will render necessary such modifications of the following directions as the experience of the operator may suggest. As a general rule, an open situation, sunshine, and, if possible, the morning sun, should be preferred, as the image is sharper, and the color produced more intense, and less affected by the subsequent fixing process.

NEGATIVE PICTURES.—In the camera, for a building, and exposure of half a minute in strong sunshine is usually sufficient; for a portrait, which can only be taken in the shade, two or three minutes are required.

Exact copies of prints, feathers, leaves, &c., may be taken, by exposing them to the light in the copying-frame, until the margin of the prepared paper, which should be left uncovered, begins to change color very slightly. If the object to be copied is thick, the surface must be allowed to assume a darker tint, or the light will not have penetrated to the paper.

When the paper is taken from the camera, nothing is visible upon it; but by attending to the following directions the latent picture will quickly develop itself. Having mixed together about one drachm of a saturated solution of *protosulphate of iron* and two or three drachms *mucilage of gum arabic*, pour a small quantity into a flat dish. Pass the prepared side of the paper taken from the camera rapidly over this mixture, taking care to ensure complete contact in every part. If the paper has been sufficiently impressed, the picture will almost immediately appear, and the further action of the iron must be stopped by the application of a soft sponge and plenty of clean water. Should the image not appear immediately, or be imperfect in its details, the iron solution may be allowed to remain upon it a short time; but it must then be disturbed, by rapidly but lightly brushing it up, otherwise numerous black spots will form and destroy the photograph. Great care should be taken that the iron solution does not touch the back of the picture, which it will inevitably stain, and the picture being a negative one, be rendered useless as a copy. A slight degree of heat will assist the development of

the image where the time of exposure has been too short.

The picture should be carefully washed to take off any superficial blackness, and may then be permanently fixed by being soaked in water, to which a small quantity of ammonia or, better still, hyposulphite of soda has been added. The paper must again be well soaked in clean water, to clear it from the soluble salts, and may then be dried and pressed.

POSITIVE PICTURES.—These are procured in the same manner as the copies of the prints, &c. just described: using the negatives before obtained in place of the objects themselves. Instead, however, of using the iron solution, the paper must be exposed to the light, in the frame, a sufficient time to obtain perfect copies. The progress of the picture may be observed by turning up the corner of the paper, and, if not sufficiently done, replacing it exactly in the same position. They should be fixed with hyposulphite as above directed.

At a meeting of the British Association at York in 1844, I showed, by a series of photographs, that the *protosulphate of iron* was most effective in developing any photographic images, on whatever argentiferous preparation they may have been received. Every subsequent result has shown that with proper care it is the most energetic agent for developing with which we are acquainted. The difficulty of obtaining, and of preserving, the salt free of any peroxide, has been the principal cause why it has not been as generally employed as the gallic acid. Mr. Robert Ellis has recommended the use of the protonitrate of iron as a developing agent.

At the meeting of the British Association at Plymouth in 1841, I first directed attention to the use of the ferroprussiate of potash in combination with the iodide of silver. The process resulting from this being very important in many points, the abstract of the paper then read, as given in the Transactions of the Sections, is reprinted.

The author having been engaged in experiments on those varieties of photographic drawings which are formed by the action of the hydriodic salts on the darkened chloride of silver, and with a view to the removal of the iodide formed by the pro-

cess from the paper, was led to observe some peculiar changes produced by the combined influences of sunshine and the ferrocyanate of potash. It was found that the ordinary photographic paper, if allowed to darken in sunshine, and then slightly acted on by any hydriodic salt, and, when dry, washed with a solution of the ferrocyanate of potash, became extremely sensitive to light, changing from a light-brown to a full black by a moment's exposure to sunshine. Following out this result, it was discovered that perfectly pure iodide of silver was acted on with even greater rapidity, and thus it became easy to form an exquisitely sensitive photographic paper.

The method recommended is the following:—

Highly glazed letter paper is washed over with a solution of one drachm of nitrate of silver to an ounce of distilled water; it is quickly dried, and a second time washed with the same solution. It is then, when dry, placed for a minute in a solution of two drachms of the hydriodate of potash in six ounces of water, placed on a smooth board, gently washed by allowing some water to flow over it, and dried in the dark at common temperatures. Papers thus prepared may be kept for any length of time, and are at any time rendered sensitive by simply washing them over with a solution formed of one drachm of the ferrocyanate of potash to an ounce of water.

These papers, washed with the ferrocyanate, and dried in the dark, are, in this dry state absolutely insensible, but they may at any moment be rendered sensitive by merely washing them with a little cold clean water.

Papers thus prepared are rendered quite insensible by being washed over with the above hydriodic solution. They are, however, best secured against the action of time by a solution of ammonia. The yellow color of the paper militates against its being used as the original from which copies may be taken; but even this color may be removed by employing hot hyposulphite of soda.

Upon paper thus prepared the curious result of an impressed colored spectrum was first obtained.

THE FLUOROTYPE, so called from the introduction of the salts of fluoric acid,

consists of the following process of manipulation:—

- { Bromide of potassium...20 grains.
- { Distilled water.....1 fluid ounce.
- { Fluuate of soda.....5 grains.
- { Distilled water.....1 fluid ounce.

Mix a small quantity of these solutions together when the papers are to be prepared and wash them once over with the mixture, and, when dry, apply a solution of nitrate of silver, sixty grains to the ounce of water. These papers keep for some weeks without injury, and become impressed with good images in half a minute in the camera. The impression is not sufficiently strong when removed from the camera for producing positive pictures, but may be rendered so by a secondary process.

The photograph should first be soaked in water for a few minutes, and then placed upon a slab of porcelain, and a weak solution of the proto-sulphate of iron brushed over it; the picture almost immediately acquires an intense color, which should then be stopped directly by plunging it into water *slightly* acidulated with muriatic acid, or the blackening will extend all over the paper. It may be fixed by being soaked in water, and then dipped into a solution of hypo-sulphite of soda, and again soaked in water as in the other processes.

Mr. Bingham has the following remarks on this process, and he gives a modified form, into which a new photographic element is introduced.

“We find it is better to add to the proto-sulphate of iron a little acetic or sulphuric acid; this will be found to prevent the darkening of the lights of the picture to a great extent, and it will be found better not to prepare the paper long before it is required for use, this being one reason why the picture often becomes dusky on application of the proto-sulphate.

“Reasoning upon the principle that the action of light is to reduce the salts of silver in the paper to the metallic state, and that any substance which would reduce silver would also quicken the action of light, we were led to the following experiment: The protochloride of tin possesses the property of reducing the salts both of silver and of gold; a paper was prepared with the bromide of silver, and previously to exposing it to light, it was washed over with

a very weak solution of the chloride of tin; the action of light upon the paper was exceedingly energetic; it was almost instantaneously blackened, and a copy of a print was obtained in a few seconds."

DR. SCHAFHAEUTL'S NEGATIVE PROCESS.

At the tenth meeting of the British Association for the Advancement of Science, two new processes on paper, and one on metal, were brought forward by Dr. Schafhaeutl. These processes involve some very delicate manipulatory details, which render them tedious, and, in the hands of the inexperienced, uncertain. However, as they sometimes give very perfect results, it would have been improper to have omitted them.

Penny's improved patent metallic paper is recommended. This is spread with a concentrated solution of the nitrate of silver, (140 grains to $2\frac{1}{2}$ drachms of fused nitrate, to 6 fluid drachms of distilled water), by merely drawing the paper over the surface of the solution contained in a large dish. In order to convert this nitrate into a chloride, the author exposed it to the vapors of boiling muriatic acid. A coating of a chloride of silver, shining with a peculiar silky lustre, was by this method generated on the surface of the paper, without penetrating into its mass; and in order to give to this coating of chloride the highest degree of sensibility, it was dried, and then drawn over the surface of the solution of nitrate of silver again. After having been dried, the paper was ready for use, and by no repetition of this treatment could its sensitiveness be improved.

Even on the ordinary kinds of writing paper, I have found this manipulation produce extreme sensitiveness, but much exact attention is required to prevent any excess of muriatic acid, which, in the state of vapor, is rapidly absorbed by the paper. The whole of the nitrate of silver employed in the first instance must be converted into a muriate, and there the process should stop.

Schafhaeutl's method of fixing is extremely difficult. The drawing is to be steeped for five or ten minutes in alcohol, and, after removing all superfluous moisture by means of blotting paper, and drying it slightly before the fire, the paper thus prepared is drawn through diluted

muriatic acid, mixed with a few drops of an acid nitrate of quicksilver, prepared by dissolving quicksilver in pure nitric acid, and again dissolving the crystallized salt to saturation in water acidulated with nitric acid. The addition of the nitrate of mercury requires great caution, and its proper action must be tried first on slips of paper, upon which have been produced different tints and shadows by exposure to light; because if added in too great a quantity, the lightest shades entirely disappear. The paper having been drawn through the above mentioned solution, is well washed in water, and then dried in a degree of heat approaching to about 158° Fahr., or in fact, till the white places assume a very slight tinge of yellow. The appearance of this tint indicates that the drawing is fixed permanently.

DR. SCHAFHAEUTL'S PROCESS ON CARBONISED PLATES.

Metallic plates are covered with a layer of hydruret of carbon separated by dissolving pitch in alcohol, and collecting the residuum on a filter. This, when well washed, is spread as equally as possible over a heated even plate of copper. The plate is then carbonized in a closed box of cast iron, and, after cooling, passed betwixt two polished steel rollers, resembling a common copper-plate printing press. The plate, after this process, is dipped into a strong solution of nitrate of silver, and instantly exposed to the action of the camera. The silver is, by the action of the rays of the sun, reduced into a perfectly metallic state, and the lights are expressed by the different density of the milk-white deadened silver; the shadows by the black carbonized plate. In a few seconds the picture is finished, and the plate is so sensitive, that the reduction of the silver begins even by the light of a candle. For fixing the image, nothing more is required than to dip the plate in alcohol mixed with a small quantity of the hyposulphite of soda, or of pure ammonia.

These processes are given on the authority of the author; but I have never been successful in producing a good result with either of them. The preparation of the plate requires the skill of an artist combined with the knowledge of a chemist; and even these are not always sufficient to en-

sure a perfect surface. The revival of the silver is not to be depended on; sometimes it does form a continuous sheet over the parts acted on by the light, but often it is only spangles; and frequently a metallic arborescence will commence in the light parts, and run rapidly into the portions in shadow. The fact is, that light has the property of effecting the revival of the silver spread upon any carbonaceous body, but caloric having the same effect, and being indeed rather more active in the operation than light is, any slight increase of temperature produces a revival of the metal over the parts in shadow.

Reference to the early volumes of Nicholson's Journal will afford ample evidence of these facts, which I have also recently proved. These volumes contain some papers by Count Rumford on the revival of gold and silver from their solutions, by heat and light, when spread upon charcoal or carbonaceous earth. This philosopher has conclusively shown, that this revival is more dependent on the action of heat than light, which accounts, in some measure, for the apparent effect of candlelight. It is, however, possible, that this process may, with some modifications, become of importance.

THE INFLUENCE OF CHLORINE AND IODINE IN RENDERING SOME KINDS OF WOOD SENSITIVE TO LIGHT.

Having on many occasions subjected the simply nitrated photographic paper to the influence of chlorine and iodine in close wooden boxes, I was often struck with the sudden change which light produced on the wood of the box, particularly when it was of deal; changing it in a few minutes from a pale yellow to a deep green. This curious effect frequently occurring, led me to observe the change somewhat more closely, and to pursue some experiments on the subject. These produced no very satisfactory result. They proved the change to depend much on the formation of hydrochloric and hydriodic acids, and the decomposition of water in the pores of the wood. I found well-baked wood quite insusceptible of this very curious phenomenon. The woods of a soft kind, as the deal and willow, were much sooner influenced than the harder varieties, but all the light-colored woods appeared more or less

capable of undergoing this change. All that is necessary is, to place at the bottom of an air-tight box, a vessel containing a mixture of manganese and muriatic acid, or simply some iodine, and fix the piece of wood at some distance above it. Different kinds of wood require to be more or less saturated with the chlorine or iodine, and consequently need a longer or shorter exposure. The time, therefore, necessary for the wood to remain in the atmosphere of chlorine can only be settled by direct experiment. Wood is impregnated very readily with iodine, by putting a small portion in a capsule a few inches below it. It does not appear to me at present that any practical result is likely to arise out of this peculiar property: it is only introduced as a singular fact, which is perhaps worthy a little more attention than my numerous engagements have left me time to devote to it.

In my first publication on this subject, in Griffin's Scientific Miscellany, I introduced the following process, which, although it has never yet been properly worked out, involves many points of interest:—Many extremely curious results, which are omitted from their not having any practical bearing led me to examine the effect of the mercurial vapor on the pure precipitated iodides and bromides. I was long perplexed with some exceedingly anomalous results, but being satisfied from particular experiments that these researches promised to lead to the discovery of a most sensitive preparation, I persevered in them. Without stopping to trace the progress of the inquiry, I may at once state, that I have the satisfaction of being enabled to add to the present treatise an account of a process which serves to prepare papers that are much more sensitive than Daguerre's iodinated plates. The exquisite delicacy of these new photographic papers may be imagined when I state, *that in five seconds in the camera-obscura, I have, during sunshine, obtained perfect pictures; and that, when the sky is overcast, one minute is quite sufficient to produce a most decided effect.* The action of light on this preparation does, indeed, appear to be instantaneous. On several occasions I have procured, in less than a second, distinct outlines of the objects to which the camera has been pointed, and even secured re-

presentations of slowly moving bodies. With this great increase of sensitiveness, we of course secure greater sharpness of outline, and more minute detail. It should be understood that the process is a negative one, from which positive pictures may be produced on the ordinary photographic paper by transfer.

To prepare this very sensitive paper, we proceed as follows:—Select the most perfect sheets of well glazed satin post, quite free from specks of any kind. Placing the sheet carefully on some hard body, wash it over on one side by means of a very soft camel's hair pencil, with a solution of sixty grains of the bromide of potassium in two fluid ounces of distilled water, and then dry it quickly by the fire. Being dry, it is again to be washed over with the same solution, and dried as before. Now, a solution of nitrate of silver, one hundred and twenty grains to the fluid ounce of distilled water, is to be applied over the same surface, and the paper quickly dried in the dark. In this state the papers may be kept for use. When they are required, the above solution of silver is to be plentifully applied, and the paper placed *wet* in the camera, the greatest care being taken that no day-light, not even the faintest gleam, falls upon it, until the moment when we are prepared, by removing the screen, to permit the light, radiated from the objects we wish to copy, to act in producing the picture. After a few seconds, the light must be again shut off, and the camera removed into a dark room. It will be found, on taking the paper from the box, that there is but a very slight outline, if any, as yet visible. Place it aside, in *perfect darkness*, until quite dry, then fix it in a mercurial vapor box, and apply a very gentle heat to the bottom. The moment the mercury vaporizes, the picture will begin to develop itself. The spirit lamp must now be removed for a short time, and when the action of the mercury appears to cease, it is to be very carefully applied again, until a well defined picture is visible. The vaporization must now be suddenly stopped, and the photograph removed from the box. The drawing will then be very beautiful and distinct; but much detail is still clouded, for the development of which it is only necessary to place it cautiously in the dark, and allow it to remain undisturbed for

some hours. There is now an inexpressible charm about the picture, equalling the delicate beauty of the Daguerreotypes; but being still very susceptible of change, it must be viewed by the light of a taper only. The nitrate of silver must now be removed from the paper by well washing in soft water, to which a small quantity of salt has been added, and it should be afterwards soaked in water only. When the picture has been dried, wash it quickly over with a soft brush, dipped in a warm solution of the hyposulphite of soda, and then well wash it for some time in the manner directed for the ordinary photographs, in order that all the hyposulphite may be removed. The drawing is now fixed, and we may use it to procure positive pictures, many of which may be taken from one original. The transfers procured from this variety of negative photographs have more decision of outline, and greater sharpness in all their minute detail, than can be procured by any other method. This is owing to the opacity produced by the curious combination of mercury and the bromide of silver, which is not, I believe, described in any chemical work.

This very beautiful process is not without its difficulties; and the author cannot promise that, even with the closest attention to the above directions, annoying failures will not occur. It often happens that some accidental circumstance, generally a projecting film, or a little dust, will occasion the mercurial vapor to act with great energy on one part of the paper and blacken it, before the other portions are at all affected. Again, the mercury will sometimes accumulate along the lines made by the brush, and give a streaky appearance to the picture, although these lines were not at all evident before the mercurial vapor was applied.

The action, however, of this photographic preparation is certain; and although a little practice may be required to produce finished designs, yet very perfect copies of nature may be effected with the greatest possible ease and certainty.

I have stated that the paper should be placed wet in the camera: the same paper may be used dry, which is often a great convenience. When in the dry state, a little longer exposure is required, and instead of taking a picture in four or five

seconds, two or three minutes are necessary.

I cannot conclude without remarking, that it appears to me that this process, when rendered complete by the improvement of its manipulatory details, will do much towards realizing the hopes of those who were most sanguine of the ultimate perfection of photography; and will convince others who looked upon the art as a philosophical plaything, that the real utility of any discovery is not to be estimated from the crude specimens produced in its infancy, ere yet its first principles were evident to those who pursued it with an eager hope.

I have purposely retained the words which I employed in 1841, being satisfied that we shall eventually witness their realization in the production of a most beautiful and sensitive process.

THE CATALYSOTYPE.—This process of Dr. Woods' is capable of producing pictures of superior excellence. Owing to the inconstancy of the iodine compounds, it is a little uncertain, but care being taken to ensure the same degree of strength in the solutions, a very uniformly good result may be obtained. The process and its modifications are thus described by the inventor.

While investigating the property which sugar possesses, in some instances, of preventing precipitation, I noticed that when syrup of ioduret of iron, was mixed in certain proportions with solution of nitrate of silver, the precipitate was very quickly blackened when exposed to the light, and I thought that, if properly used, it might be employed with advantage as a photographic agent. If not entirely without profit, it would hardly repay the trouble of reading the history of all the experiments I tried in order to prove whether or not this idea were correct, for there were many difficulties to be overcome, and unexpected hindrances to be surmounted, before I could be certain of success. However, the results at which I have arrived make me hope that my trouble has not been thrown away, and that a photographic process has been discovered, which is more manageable and more satisfactory than any which has before been used; and I think that the pictures produced by it are more minutely and delicately brought out, and the time

for their production at least not longer than is required by any other method.

To enter very minutely into the particulars or to explain the rationale of the process would be too tedious; however, it is so simple, that those who will feel any pleasure in trying it will, I am sure, easily succeed, and to attempt any explanation of its theory would, in the present state of our knowledge of light, be advancing a mere hypothesis: I will, therefore, only state generally the method in which the paper is prepared, and then briefly giving my reasons for such parts of the process as are not at first sight obvious, will thereby enable the experimenter to be guarded against the failures that these precautions are intended to overcome.

Let well glazed paper (I prefer that called wove post) be steeped in water to which hydrochloric acid has been added in the proportion of two drops to three ounces. When well wet, let it be washed over with a mixture of syrup of ioduret of iron half a drachm, water two drachms and a half, tincture of iodine one drop.

When this has remained on the paper for a few minutes, so as to be imbibed, dry it lightly with bibulous paper, and being removed to a dark room, let it be washed over evenly, by means of a camel hair pencil, with a solution of nitrate of silver, ten grains to the ounce of distilled water. The paper is now ready for the camera. The sooner it is used the better; as when the ingredients are not rightly mixed it is liable to spoil by keeping. The time I generally allow the paper to be exposed in the camera varies from two to thirty seconds; in clear weather, without sunshine, the medium is about fifteen seconds. With a bright light, the picture obtained is of a rich brown color; with a faint light, or a bright light for a very short time continued, it is black. For portraits out of doors, in the shade on a clear day, the time for sitting is from ten to fifteen seconds.

If the light is strong, and the view to be taken extensive, the operator should be cautious not to leave the paper exposed for a longer period than five or six seconds as the picture will appear confused from all parts being equally acted on. In all cases, the shorter the time in which the picture is taken the better.

When the paper is removed from the

camera no picture is visible. However when left in the dark without any other preparation being used, for a period which varies with the length of time it was exposed, and the strength of the light, a negative picture becomes gradually developed, until it arrives at a state of perfection which is not attained, I think, by photography produced by any other process.* It would seem as if the salt of silver, being slightly affected by the light, though not in a degree to produce any visible effect on it if alone, sets up a catalytic action, which is extended to the salts of iron, and which continues after the stimulus of the light is withdrawn. The catalysis which then takes place has induced me to name this process, for want of a better word, the Catalysotype. Sir J. Herschel and Mr. Fox Talbot have remarked the same fact with regard to other salts of iron, but I do not know of any process being employed for photographic purposes, which depends on this action for its development, except my own.

My reason for using the muriatic solution previous to washing with the ioduret of iron is this: I was for a long time tormented by seeing the pictures spoiled by yellow patches, and could not remedy it, until I observed that they presented an appearance as if that portion of the nitrate of silver which was not decomposed by the ioduret of iron had flowed away from the part. I then recollected that Sir J. Herschel and Mr. Hunt had proved that iodide of silver is not very sensitive to light, unless some free nitrate be present. I accordingly tried to keep both together on the paper, and after many plans had failed, I succeeded by steeping it in the acid solution, which makes it freely and evenly imbibe whatever fluid is presented to it. I am sure that its utility is not confined to this effect, but it was for that purpose that I first employed it.

* The picture, when developed, is not readily injured by exposure to moderate light; it ought, however, to be fixed, which may be done by washing it with a solution of bromide of potassium, fifteen or twenty grains to the ounce, or iodide of potassium, five grains to the ounce. It may either be applied with a camel hair pencil or by immersion. The picture must then be well washed in water to remove the fixing material, which would cause it to fade by exposure to light.

My reason for adding the tincture of iodine to the syrup is, that having in my first experiments made use of, with success, a syrup that had been for some time prepared, and afterwards remarking that fresh syrup did not answer so well, I examined both, and found in the former a little free iodine; I therefore added a little tincture of iodine with much benefit, and now always use it in quantities proportioned to the age of the syrup.

The following hints will, I think, enable any experimenter to be successful in producing good pictures by this process. In the first place the paper used should be that called wove post, or well glazed letter paper. When the solutions are applied to it, it should not immediately imbibe them thoroughly, as would happen with the thinner sorts of paper. If the acid solution is too strong, it produces the very effect it was originally intended to overcome; that is, it produces yellow patches, and the picture itself is a light brick color, on a yellow ground. When the tincture of iodine is in excess, partly the same results occur; so that if this effect is visible, it shows that the oxide of silver which is thrown down is partly re-dissolved by the excess of acid and iodine, and their quantities should be diminished. On the contrary, if the silver solution is too strong, the oxide is deposited in the dark, or by an exceedingly weak light, and in this case blackens the yellow parts of the picture which destroys it. When this effect of blacking all over takes place, the silver solution should be weakened. If it be too weak, the paper remains yellow after exposure to light. If the ioduret of iron be used in too great quantity, the picture is dotted over with black spots, which afterwards change to white. If an excess of nitrate of silver be used, and a photograph immediately taken before the deposition of the oxide takes place, there will be often after some time a positive picture formed on the back of the negative one. The excess of the nitrate of silver makes the paper blacker where the light did not act on it, and this penetrates the paper; whereas the darkening produced by the light is confined to the surface. The maximum intensity of the spectrum on the paper, when a prism of crown glass is used, lies between the indigo and blue ray. The difference of effect

of a strong and weak light is beautifully shown in the action of the spectrum: that part of the paper which is exposed to the indigo ray is colored a reddish brown, and this is gradually darkened towards either extremity, until it becomes a deep black.

I have not had many opportunities of experimenting with the catalysotype, but it certainly promises to repay the trouble of further investigation. The simplicity of the process, and the sensibility of the paper, should cause it to be extensively used. It has all the beauty and quickness of the calotype, without its trouble, and very little of its uncertainty; and, if the more frequent use of it by me, as compared with other processes, does not make me exaggerate its facility of operation, I think it is likely to be practised successfully by the most ordinary experimenters.

Supplement to the preceding paper.

Since the preceding paper was written, I have been experimenting with the catalysotype, and one day having had many failures, which was before quite unusual with me, I am induced to mention the cause of them, for the benefit of subsequent experimenters. The paper I used was very stiff and highly glazed, so that the solution first applied was not easily imbibed. The blotting paper was very dry and bibulous. When using the latter, I removed nearly all the solution of iron from the first, and, of course, did not obtain the desired result.

While varying the process in endeavoring to find out the cause just mentioned, I discovered that the following proportions gave very fine negative pictures, from which good positive ones were obtained:—take of syrup of ioduret of iron and distilled water, each two drachms; tincture of iodine, ten to twelve drops: mix. First brush this over the paper, and, after a few minutes, having dried it with the blotting paper, wash it over in the dark (before exposure in the camera) with the following solution, by means of a camel hair pencil:—take of nitrate of silver one drachm; pure water one ounce: mix. This gives a darker picture than the original preparation, and consequently, one better adapted for obtaining positive ones; it also requires no previous steeping in an acid solution. To fix the picture let it be washed

first in water, then allowed to remain for a few minutes in a solution of hydriodate of potassa (five grains to the ounce of water) and washed in water again. The paper I use is the common unglazed copy paper, but such as has a good body. I have tried the same paper with the original preparation, and find it to answer exceedingly well; it does not require in this case, either, an acid solution. The same precautions and hints apply to the amended as to the original process; such as, when it blackens in the dark, there is too much caustic used; when it remains yellow, or that it is studded with yellow spots, too much iodine; when marked with black spots, too much iron. It is necessary to mention these, on account of the varying strength of the materials employed.

With the advance of this beautiful art, there appears to be a progressively increasing desire to produce more artistic results; and numerous manipulatory improvements have recently been introduced, many of them with the most decided advantages. It is thought desirable therefore to devote a short space to the description and consideration of such of these as are the most important.

The use of collodion premises to be exceedingly advantageous. Collodion is a peculiar preparation, formed by dissolving gun-cotton in ether. It is a very mucilaginous solution of a volatile character, and the ether evaporating leaves a film of the utmost transparency behind. It is not all kinds of gun-cotton which dissolve equally well in ether. The most easily soluble is prepared by soaking good cotton in a saturated solution of nitrate of potash for some time: it is then, in a moist state, plunged into sulphuric acid with which but a small quantity of nitric acid has been mixed: after remaining in the acid for about a minute, it is well washed with water until no trace of an acid taste is discovered, and then dried at a temperature but very slightly elevated above that of the apartment.

Having obtained the collodion, the mode of proceeding best adapted for ensuring success appears to be the following:—

Iodide of silver is precipitated from a solution of the nitrate of silver by adding iodide of potassium to it; the yellow precipitate being well washed, so as to remove

every trace of nitrate of potash : it is then dissolved in a saturated solution of the iodide of potassium. This mixture is added in small quantities to the collodion, and the whole well agitated : by this means we obtain a combination of this peculiar substance with iodide of silver and potassium. Mr. Archer, who has devoted considerable attention to this preparation, prepares what he calls a collodo-iodide of silver : whether prepared in the above manner we are not certain. Mr. Archer's preparation is exceedingly sensitive, but the above is believed to be equally so. No other manipulation is necessary in using it than to pour the mixture over a glass plate held upon the hand, moving it to and fro to ensure the complete coating of every part ; the fluid is poured off by one of the corners, and the film which adheres to the glass dries almost immediately. This is then washed over with the gallo-nitrate of silver in the same manner as in the albumenized glass plates, and it is ready for the camera. Where the proportions have been happily hit upon, the result is the production of a picture almost instantaneously : very fine portraits are obtainable in about ten seconds in diffused light ; the image is developed in the same manner as in the calotype process, by the use of the gallo-nitrate of silver, and fixed by means of the hyposulphite of soda.

Mr. Horne has favored me with the following process adopted by him with much success :—

“Take a piece of flat glass cut to the size of the frame, and having washed it with water, and wiped the same quite dry, then, either by holding it at one corner, or if large, placing it on a levelling-stand, pour on the centre of the plate a good body of liquid, which will readily diffuse itself equally over the surface. Immediately pour the liquid off again into the bottle from one corner ; and by bringing the hand holding the plate down a little, that the liquid may run to the lower edge, and drawing the mouth of the bottle along, those lines first formed will run one into the other, and give a flat, even surface. Very little practice will soon enable any operator to obtain this result. The plate is now *immediately*, and before the whole of the ether has had time to evaporate, to be immersed in a bath of nitrate of silver,

30 grains to the ounce, *until the greasy appearance which it first presents on immersion is entirely gone, and the silver solution flows freely over the surface.*

“The plate should now, and in its moist state, be placed in the camera, and the picture taken ; the time of exposure varying, of course, with the light, but for a portrait, and with a moderately quick lens, from three to thirty seconds will be sufficient. Mr. Fry, who was the first to practise with collodion, has obtained beautiful portraits by placing the sitter in the open air, and simply removing the cap from the lens, and closing it again as soon as possible.

“The agent for developing these pictures is unquestionably the pyro-gallic acid, as recommended by Mr. Archer ; and I am told the proto-nitrate of iron also answers equally well. The solution of pyro-gallic acid should be made as follows :—

Pyro-gallic acid	3 grains.
Glacial acetic acid	1 drachm.
Distilled water	1 ounce.

The plate having been placed, face upwards, upon a levelling stand, a sufficient quantity of the above solution should be poured equally and quickly over the surface, and the picture allowed to develop, occasionally slightly moving the plate, to prevent the deposit which will take place settling at one spot. A few drops of a solution of nitrate of silver, five grains to the ounce, may also, in dull weather, be added to the pyro-gallic, with advantage, just before pouring it over the plate ; but in very bright weather the picture will develop sufficiently quick with the pyro-gallic acid solution alone.

“The development may be readily judged of by holding a piece of white paper occasionally under the plate ; and as soon as sufficient intensity has been obtained, the solution must be poured off, and the plate washed by a gentle stream of water. After this, the surface should be covered with a saturated solution of hypo-sulphite of soda, which will almost immediately remove the iodide. Another stream of water must then again be poured over, to free the plate from hypo-sulphite, and the picture is finished.

“In this state they are more or less negative by transmitted light, and, if not too much brought out, positive by reflected light. But I have found the most beauti-

ful and decided positives may be obtained by the simple addition to pyro-gallic solution of a minute quantity of nitric acid; care being taken not to add too much. I have also obtained purple and green pictures, the former by adding acetate of lead, and the latter with acetate of lime and ordinary gallic acid."

The resulting negative pictures on the glass are not quite so adherent as those formed with albumen; care must therefore be taken to avoid rubbing it off, or the glass plate may be covered with a colorless spirit varnish, by which, when dry, the photographic image is perfectly fixed.

In this process the ether, without doubt, plays a very important part, although the largest portion evaporates readily; an intimate chemical combination of this volatile hydro-carbon takes place with the peculiar substance—gun-cotton—employed. At a very early period of photographic investigation, it was found that both alcohol and ether produced several remarkable effects; in some cases the processes were very much quickened; in others, the resulting tone of the darkened paper was of a much deeper and richer color.

Experiments are yet required to determine the operation of these organic compounds. From the action of many of them it would appear that it is to this order of chemicals that we have now to look for the greatest improvements in photography.

Lacturine and caseine have been both recommended as media for preparing glass surfaces for the photographic processes. These compounds, which are of a very analogous character, are prepared from butter-milk, by the action of acids: it is proposed that they should be used dissolved in ammonia. When this is done, the glass being uniformly coated by flooding the solution over it, it may be allowed to stand in a warm place, free from dust, to dry: this occupies some time, but if the process has been carefully attended to, the resulting coating is very uniform and clear. Iodide of potassium or of ammonia may be mixed with the caseine solution before it is applied, the other parts of the process being precisely similar to those already described. It has always been deemed of the utmost importance in the processes on paper to keep the chemical agents which are to be operated upon by the solar radiations,

as much as possible on the surface. Several plans have been proposed, and albumenized paper has been largely employed. It is, however, found that wax paper answers far better than any other. The fact that water cannot be spread upon wax may appear to be a difficulty in the way of successful manipulation, but there are means by which this can be overcome; the most successful being the following:—A sheet of good writing paper is placed upon a hot iron plate, and rubbed over with wax until thoroughly saturated, taking care that the wax is uniformly diffused. If there should be an accumulation in any part, the paper is to be held up by one corner, in front of a fire sufficiently hot to liquify it and allow it to flow off from the opposite corner. A great many sheets of this paper can be prepared at a time, and kept until required. To give these the sensitive coating, a large dish must be procured, and filled with a solution of the iodide of potassium; if the paper is simply dipped in and then removed it will be found to remain quite dry, owing to the repulsive action exerted between the water and the wax. Sheets of waxed paper are to be passed into the solution one after another, taking care to remove any air-bubbles which may form on the surface of each, until as many as may be required are inserted, and the whole allowed to remain two or three hours. In that time a considerable quantity of iodide of potassium has been absorbed, and on removing the papers and drying them, it will be found, upon the application of the nitrate of silver, that a beautiful surface of the iodide will be produced on these papers, whether we employ the calotype or the ferrotype process, from the circumstance that the chemical agents are retained on the very surface of the paper. The resulting pictures are beautifully transparent, not in any respect inferior for copying from than those negatives which are waxed after the picture has been obtained, and all the details are very charmingly preserved.

The addition of the fluoride of sodium to the iodide or chloride, in the first preparation of the paper, we have alluded to, and there can be no doubt but it possesses considerable accelerating power. This preparation has been recently introduced as a novelty, but the following process is described in the author's *Researches on Light*:

The fluorates of soda and of potash have been used in many different manners, and variously combined. It has been found that the fluorate of soda has the property of quickening the sensibility of bromidated papers to a very remarkable extent; and from this quality a new process, which I would distinguish by the name of the fluoro-type, results.

THE FLUOROTYPE.—This process, which is characterized by its manipulation, and by the sensibility of the papers when carefully prepared, consists in the formation of a salt of silver, which I suppose must be considered as a fluo-bromide of silver. It is at present somewhat difficult to say which is the most efficacious manner of proceeding; but the difference, as it regards the sensibility of papers, is so very trifling, that this is not of much consequence. The paper may be washed first with the bromide of potassium, and then with the fluorate of soda; or, which will be found on the whole the best plan, the two salts may be united. The strength of the solutions should be as follows:—

Bromide of Potassium	20 grains.
Distilled Water	1 fluid ounce.
Fluorate of Soda	5 grains.
Distilled Water	1 fluid ounce.

Mix a small quantity of these solutions together when the papers are to be prepared, and wash the paper once over with the mixture, and when dry, apply nitrate of

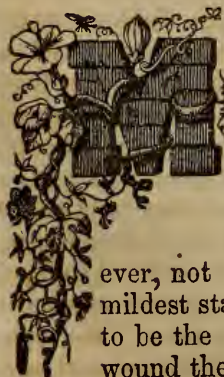
silver in solution, 60 grains to an ounce of water. The papers appear to keep for some weeks without injury, and they become impressed with good images in half a minute in the camera. This impression is not sufficiently strong to serve, in the state in which it is taken from the camera, for producing positive pictures, but it may be rendered so by a secondary process.

The photograph is first soaked in water for a few minutes; it is then placed upon a slab of porcelain or stone, and a weak solution of the protosulphate of iron applied which very readily darkens all the parts on which the light has acted, to a deep brown, and every object is brought out with great sharpness. When the best effect is produced, the process must be stopped, or the lights suffer. All that is necessary is to soak the paper in water, and then fix the drawing with hyposulphite of soda. This process admits of numerous modifications, and in several experiments with the spectrum, an impressed image in natural colors was obtained. Indeed the most satisfactory evidences of photographic coloration yet obtained involved the use of the fluoric acid in some of its combinations.

Pyro-gallic acid, which is easily obtained by sublimation from an extract of galls, may be employed with much advantage as a developing agent instead of gallic acid, over which, indeed, it possesses some advantages.

TO BE CONTINUED.

COMMUNICATIONS.



R. EDITOR:—There is a topic on which I have long desired to say something in your journal, as *here* it will probably reach the largest number of those whom it concerns. It is, however, not easily handled, since the mildest statement of what is known to be the truth, can hardly fail to wound the self-love of many. But you, Sir, cannot *consistently* censure my undertaking, after having so often,

in your journal, stated *substantially* the very facts on which I am to comment, and especially after having adopted virtually, as your governing principle, the maxim, "Fiat Justitia, ruat cælum." "Be justice done though the heavens fall."

I can perhaps best present the matter I would discuss in the form of a few interrogatories; as, for example:—

1st. Why do the daguerrean body hold a position, both as artists and as men, so far below the undeniable claims of the art they practise?

2d. Why do we witness among them so

much clash and bickering ; so many covert attacks and contumelious insinuations of one against another ; so little of frank, cordial recognition of each other's attainments and standing in their common profession, &c., &c. ?

3d. Why is it, that, among artists and even artisans in all their kinds, the daguerreotypists stand absolutely alone in their inability to *combine*, and to employ the requisite means for improving their art to the highest practicable degree ?

4th. Why, out of so large a number of practitioners, are there so few who produce daguerreotypes that win approval and commendation from true artists and amateurs ? And, conversely, why is it, that the great majority of daguerreotypes produced are of a quality so indifferent as fully to *justify* their being advertised, as they sometimes are, at three shillings a-piece including the case ; although these advertisers are little aware that this price is all, and even more than all, their actual artistic value ?

I might draw out the statement of my topic into more queries than even these, but for my present purpose these will suffice to give *offence* where my sole desire is to *serve*. In fact, the first impulse of many would be, I presume, to deny flatly the *truth* of the affirmations implied in my questions. But an individual may not testify in his own cause *here* more than *elsewhere*. The merits of the daguerreotypist must be pronounced upon by the tribunal which alone is qualified to discern and judge of them. This tribunal is constituted by those artists in various kinds, and those amateurs who, through native endowments and adequate culture, have become competent either to *produce* artistic works of excellence, or to recognise and decide upon the beauties and faults of such works when produced. To this tribunal, be it noted, all other artists are not less amenable than the daguerreotypist, and by its verdicts must, equally with him, stand or fall.

Now, when I said that I *knew* the statements above presented were *true*, I meant that I had heard several of the most eminent artists, as well as of the ablest judges of art among us, pronounce this opinion repeatedly in the most emphatic terms. Their opinion, superadded to my own, such as it is, and coupled with what I know from various sources, of the conduct open and

covert of daguerreotypists in relation to each other, gives me the strongest possible conviction of the *justice* of the above charges against the majority of the daguerrean body.

But ought such things to be ? Are there not practitioners enough who love their art sufficiently well, and are sufficiently concerned for its fair fame, not only to desire, but to be willing to labor for their correction ? We certainly hope and trust so

But the first and an indispensable step towards the amendment of errors is to understand thoroughly their *causes*. Let us see, then, if some facts may not be suggested, which do of necessity operate as causes to produce these results.

1st. The *motive* which induces great numbers to adopt this vocation is *purely mercenary*. That is, they desire, on the one hand, to *earn money rapidly*, and on the other, to escape *manual labor*, which they stigmatise as "hard work." The daguerreotype business, they think, will fulfill both these conditions.

Now every sagacious, sound-judging man knows, that neither of these impulses acting singly nor both united, are calculated to urge their subject onward and upward to high excellence. The first of the two, or the desire of "making money," is useful enough in its proper place, and kept in due subordination ; though we doubt strongly whether the desire *merely* to escape the necessity of winning our bread by the "sweat of our brow," be *ever* a useful or commendable one. At any rate it may undeniably be said of both, that they stand in the very lowest rank of motives not intrinsically wrong. Being such, then, as they are, they are not suited either by their character or their force, to urge men to undertake and carry forward the toils, which are universally the price to be paid for eminence. Who ever knew, or read, or hears of an eminent painter, or sculptor, or architect, or poet, or literary, or professional man, or philanthropist, or I will venture saying, even merchant or mechanic, who attained this distinction *merely* through the love of *money*, or *love of ease*, or the *two combined* ? Nobody, we are sure. And, most especially, throughout the whole sphere of the fine arts these impulses are among the weakest of the weak.

There are two motives, which acting *singly* or *jointly*—most commonly, the *latter*, appear to be the most potent of all impulses to eminence in arts. These are the *love of the art for its own sake*, and the love of *reputation*, or “fame.”

“That last infirmity of noble minds.”

Milton himself, religiously conscientious as he was, acknowledges, that one leading principle which inspired and sustained him through the long years of blindness, penury and calumny, devoted to the creation of his immortal epic, was the “hope of producing something which the world would not willingly let die.” Now, it is familiarly known that the *love* of any *thing* or *person*, is a sentiment which makes no account of the labors imposed by such love, but, on the contrary, rather *covets* and *seeks* their performance. And the love of money, so far from being a *rival* to *such* love, stands in so complete a subordination thereto, that money in whatever amounts is valued for no other reason, than it may be lavished on the object loved.

What account, moreover, does the love of distinction make of money or of ease? Why it pours out the one like water and ignores the very name of the other, so it may satisfy its own cravings. Nor this alone; for not unfrequently it sacrifices health with all the sweetest affinities and purest pleasures of life for the attainment of the same end. You have but to glance over the histories of such as have achieved eminence in any of the arts, to find them not only among the most laborious of men; pertinaciously breasting difficulties, antagonisms, privations and hardships the most ruinous and severe; but so reprehensibly prodigal and careless of money, when casually possessing it, as to suffer from absolute penury through no small portion of their lives!

Such being the testimony of history—and it is fully confirmed by observation—what probability or even possibility is there, that the daguerreotypist should attain excellence in his vocation under the instigation, from first to last, of the love of money and of ease? Such excellence *cannot* be achieved without wearisome, long-protracted toil—the very thing to escape which he adopted this vocation. Nor less

can it be won without that fondness for and pride in the vocation, which exact for their gratification a sacrifice of time and expenditure of money wholly incompatible with avarice. Such a fondness for the Art is almost uniformly accompanied by that desire of being well reputed for achievement therein—in other phrase, that love of fame, which no less than the former loves, tramples scornfully under foot both the avarice and the indolence, which by supposition are his predominant impulses.

Let me, in closing this part of my subject, recommend to the consideration of the daguerreotypist, who would fain be a veritable artist, the following maxims, the one from a celebrated German Poet, the other from an eminent British Minstrel:—Says the former—

“He that would woo successfully the Goddess
(Art),

Let him not seek to find in her, the woman.”

Says the other—

“Oh who can tell how hard it is to climb
The steep where Fame's proud temple shines
afar?”

2nd. One main cause of the rush of such numbers into the vocation, under the impulse of the motives named above, is the low and utterly erroneous estimate, which they put upon the art and its requisitions. They consider it a mere mechanical process from beginning to end, in which, the plates being so prepared as to receive *some sort* of impress, the operator has only to station the sitter so that his shadow may fall *somehow*—it matters little *how*—on the image glass, and the Sun is held responsible for all the rest! With such views of this art, hundreds of persons, of an original capacity which precludes their learning, by an apprenticeship however protracted, to make a first rate shoe for either man or horse; and by education, tastes, manners and habits, all the reverse of artistic and gentlemanly, disqualified for the posts even of doorkeepers and porters in the Temple of Art; count themselves qualified, after a few months or weeks slipshod *tuition* (so misnamed) under a master akin to themselves, to strike an *equal* co-partnership with the bright God of Day and minister at the very innermost shrine of the Temple!

What wonder at the train of baneful consequences following such a profanation?

Of course the pictures produced by such operators are veritable caricatures, cruel parodies of their originals; and all artists and persons of judgment are driven by the spectacle from *their* precincts and resort to operators, who do not disgrace their art. These caricaturists, however, are unhappily incapable of discerning the difference between their own abortions and the productions of genuine artists, and attribute their being thus shunned by people of cultivated taste to every motive but the true one, and most commonly to a reprehensible motive. In their ill-regulated, obtuse minds, envy is speedily kindled against both these artists and their patrons, and with envy, malice and spite, calumny and depreciation join company, to be flung abroad through the columns of the venal press, and tost from tongue to tongue, until all the fraternal sentiments and the pervasive interest in a common profession, which unite other like-conditioned bodies of men, are completely annihilated. So that as a general rule, the least censurable act of a daguerrean artist, in relation to his brethren, is his careful avoidance of their company and his perfect silence with regard to them.

With this impediment to the progress of the art, resulting from the lack of all *esprit du corps* and all concert of action directed towards a single end, is combined another, which relates to the public at large. These men would *live*, and live by their vocation, be their capacities *for* it or their skill *in* it what they may. So they advertise their wares at rates most disgracefully low, and proclaim to that class of the community, whose artistic taste and knowledge are yet crude, and who at the same time, are rabid with the mania for *cheapness*, which seems absolutely to have bitten our whole people, that *their* pictures are in all points equal to the best! Numbers of credulous persons, deluded by these specious offers, flock to their rooms, and, disbursing a few shillings, triumphantly bear away certain flat-faced, leaden-looking, staring *things* purporting to represent, with matchless fidelity, themselves, their children, their friends,—things, which inevitably affect all true connoisseurs with pity and anguish.

Who can estimate the mischief and wrong perpetrated by thus corrupting

and poisoning the popular taste at its very spring? I fear the matter is too little thought of under this aspect. The daguerrean art, by producing pictures at a rate so comparatively low, as to bring them within the reach of all, would have been the precise instrumentality requisite for developing the sense of beauty and educating the artistic taste of our whole extended people. While utility flourishes and the appliances of comfort abound, as they do in no land beside, we are at the same time generally deficient in a knowledge of and a taste for the beautiful. We have no palaces, castles, nor cathedrals, and no galleries of painting and sculpture either, to call forth and train a love of art or to gratify such love when formed. But the sun-pictures of genuine daguerrean artists, brought through their cheapness within every one's possession, and thus embellishing the walls and centre-tables of every dwelling, would to no small extent supply the want of the treasures of art accumulated in older countries, and go far towards creating the artistic taste, in which we are now lacking.

What a cruel and universal wrong it is, then, that this so potent instrument of good is thus trampled into a no less potent instrument of evil! All over our land you find these vile abortions disgracing the homes of our people and diffusing their malign influence through them. Multitudes, not only of the young, but of those in all stages of life, gather from these specimens well nigh their whole idea of what art and pictorial beauty are. In short, it is thus their judgment and taste in art are formed from the outset. Of course, such persons are wrongly taught—taught to put “bitter for sweet,” black for white, ugliness for beauty. Thus trained, they are in a worse condition, than if in total ignorance, since before commencing the acquisition of correct notions, they must *unlearn* much—one of the hardest and most irksome of all human tasks.

I have no present space to enlarge upon this topic as it might well deserve. But enough has been already said to show how deep and wide is the injury inflicted on the community by the wretched productions of which I have spoken.

All these deplorable circumstances react upon the estimate put upon the daguerrean body by those cultivated and refined persons, who in the end fix the reputation and rank of any class of men. What that reputation now is in sum, I have sufficiently intimated and I need say no more on the subject. So long as the causes, at present existing, continue to operate, it is idle to hope, that this reputation will be other than it is.

But can anything be done to remedy evils so deplorable? Easily enough, if even a comparatively few of the profession desire it and *fixedly* resolve it.

For one thing I would say, let the *true daguerrean artists*, how small soever their number, fling away all *mutual jealousies*—for such it is whispered, even *these* have had—and form a closely united, *truly fraternal* association for their own improvement and the advancement of their art. These artists know well enough who each other are, and they may know themselves, if they *choose it*; for it is only the hopelessly stupid or the egotistic and the malignant, who *cannot* acquire self-knowledge. Let these men, I say, pluck out from themselves all selfish jealousy and narrow rivalry, though the very *skin* has to come also, and place themselves under the rule and impulsion of fraternal sentiments, combined with a genuine love of their art. *Then* let them constitute such an association, as I have intimated, for the attainment of the ends I have specified.

If they will do *this*, my task is done. It were superfluous pointing out a single measure for their adoption. Their own good sense and feeling would far better direct them, than my single voice.

Perhaps I should subjoin a few words of explanation to account for my strong personal interest in this subject. Having, for three years of my early life, made "drawing from nature," or portraits in crayon from life, my pursuit, I crossed the Alleghanies, twenty years ago, to avail myself of the instructions of Sully of Philadelphia, or of some eminent New York artist, as preparatory to a visit to the "Land of the Arts." As a consequence from these circumstances, my interest in the fine arts has always bordered on enthusiasm. And, although another employ-

ment of great and universal utility occupied me up to the time, when Daguerre's admirable discovery was published to the world, the fine arts never ceased to be my study and delight. And my solicitude for the advancement of the art of "Sunpainting" to a high pitch of excellence, and an elevated rank among the other fine arts, will ever prompt me to put forth every effort in my power for accomplishing this end.

My own conviction is, that the time is fast approaching when persons who are artists in *judgment* and *feeling*, if not in *name*, will be connected with every reputable daguerreian establishment and have the entire charge of the instrument; or speaking technically, will preside over the "sitting department." For on the artist, as he should in truth be, will depend the *reputation* of any establishment. By his qualifications merely it will stand or fall, however perfect in arrangement or complete and costly in all other respects. Positions, attitudes, disposition of drapery, effects of light and shade, expression of features, whether intellectual or emotional, all these things, as they must needs go forth with every daguerreotype taken in the establishment, will serve as an emphatic and undeniable testimony for or against the artistic character of the proprietor.

But, Mr. Editor, I have said enough—perhaps too much, for the present. If my remarks shall receive the consideration which my *intention* may fairly claim, you may hear from me again.

JUNIOUS.

140 Chesnut street.

PHILADELPHIA, AUG. 27, 1852.

TO CLEAN LEATHER FOR BUFFING DAGUERREOTYPE PLATES.

To 1 part of sulphuric acid add 1 part of nitric acid and 8 parts of soft water.

Soak the leather for two hours. Then make a strong solution of aqua ammonia. Soak the leather well: the ammonia will destroy the acid and loosen all impurities in the leather. Then wash the leather in soft water till the water is stainless.

Then take 8 parts of water and 1 part of nitric acid, and soak the leather well. When the leather has laid in the solution for a few minutes, place it on your buff,

wet with the nitrate solution ; then dry it by the fire till perfectly dry, and then sand paper till a fine nap appears, then brush all dust from the surface and add plenty of good rouge burnt with alcohol. Rub the buff several times and add rouge till it hugs the plate. This preparation will give a fine intense black polish, and in two-thirds less time than common buff leather.

TO MAKE A SOLUTION THAT WILL CLEAN THE PLATE AND PREPARE IT FOR THE BUFF.

Take 1 oz. of pure rock oil or pretoleum—be sure that it is pure—as no other will answer.

Then add 20 drops sulphuric ether to the oil.

Then take one oz. of alcohol and add a few drops of the oil.

These preparations for buffing and cleaning daguerreotype plates are entirely new, and after long and tedious labor I have prepared these two articles to do away with the difficulties that daguerreotypists have always labored under in having impure buffs and unclean plates to work with.

I claim for these preparations that they will clean a plate in two-thirds less time ; absorb all impurities and leave nothing but the bright native silver, and the buff will polish the plate with the same saving of labor, and give a fine black polish that cannot be given by any other preparation that yet has been prepared, and no galvanized plate can produce a finer polish, and the nitric acid being left in the buff imparts an electric principle to the plate, which gives life to the silver and makes every operator independent as far as cleaning and buffing plates are concerned.

Fully believing the above to be true, I give it to your criticism, and would be glad to have it tested by some of your first operators, and if found to be of any advantage to the daguerrean fraternity, you are at liberty to publish or not, as you please.

JOHN HUNTER,

Dag. Artist, Muscatin, Iowa.

H. H. SNELLING, Ed. Phot. Art-Journal.

MICROSCOPIC DAGUERREOTYPES.

FRIEND SNELLING.—Seeing, in your September number, an article with the

above heading, reminded me of my promise to write for your most excellent Journal my experiments in that department of the photographic art. In 1846, it was suggested to me by Rev. S. Adams, of this city, that it might be possible to daguerreotype the image of the microscope ; he was in possession of a fine "Oberhouser," which he loaned me for the trial. By removing the lens from the camera, and substituting the microscope in its place, and adjusting the object properly for seeing with the naked eye, a clear but very faint image was found projected upon the ground glass ; the light being so weak that it was hardly possible to focus it. But doing that as well as I could, and submitting a plate to its action, giving an exposure of one and a half hours, then mercurializing ; great was my astonishment and delight, when upon lifting the plate to take a peep, I saw a clear and distinct image there, thus demonstrating the possibility of indelibly fixing those hidden forms of nature now beheld by our unaided vision. The object tried was the mandible of a small spider, so small that it could only be discerned as a mere speck by the naked eye ; it was magnified on the plate to cover three-fourths of an inch surface, and every part was rendered in bold relief, showing its little comb-like appurtenances to perfection, equally as well as represented to the eye in the instrument, the only defect in this first proof was a small light spot exactly in the middle of the plate, which we found was caused by a prism used in the microscope to reflect the image at right angles. On removing that, the next proof was without a blemish. My next experiment was with test object scales of the Sepizma ; and truly they were a test for daguerreotyping. I could do every part well enough but the cross striae, which are only brought out with instruments of the very best manufacture ; when so high a power is used as is here necessary, a great loss of light is experienced, requiring an exposure of many hours, which every one acquainted with daguerreotyping, knows is not favorable to fine results. I succeeded in doing them with the finest instrument, as well as a second-rate one would show them to the eye. I find a much better way for ordinary purposes, instead of a microscope with eye-pieces, is to use sim-

ply a double or treble achromatic, of a combined focus, of from one-fourth to one inch in length, according to the character of the object and the extent desirable to magnify; a section of woody fibre, for instance, an eighth of an inch in diameter, an image of which it would be desirable to impress on a plate five inches in diameter, (seen as a transparent object), I should use a lense about half-an-inch focus, and all that is to be done to do it is to have these little lenses set in the brass plate which will screw into the camera where the daguerreotype lens unscrews, then support the slip of wood to be magnified half-an-inch before the lense, on a little slide prepared to hold it, that can be made to move back and forwards a quarter of an inch or so, then by pointing the camera towards the rim, and having the wood just in the focus of the small lense, a beautiful distinct magnified image of it will be seen on the ground glass of the camera, in size just in proportion as the camera box is lengthened or shortened, and the wood supported on the stand moved nearer to or further from the lense. If the box is lengthened and the object moved slightly towards the lense, the image will be larger; if short-

ened, and the object carried a little away from the lense, smaller.

Its brilliancy is greatly increased if the sunlight is condensed upon the object by means of a lense; one about two inches in diameter and three or four inches focal length answers the purpose well, always being careful not to exactly focus the sunlight upon the object, if so it would be injured by the heat.

An opaque microscope is easily made by condensing sunlight upon the side of the object nearest the little magnifying lense, instead of letting the light pass through the object as in the former case.

By this most simple means it is in the power of every daguerreotypist to greatly aid the naturalist in his researches, giving him in a few moments drawings of invisible objects pencilled by Nature's own hand, which it would be impossible for him to obtain in any other way, and he also possesses himself with an invaluable collection of natural objects that would be of great interest to the public.

JOHN A. WHIPPLE,

No. 96 Washington-st. Boston.

Oct. 7th, 1852.

ON ACIDS. III.—MINERAL ACIDS.*



HYDROCYANIC ACID.—Prepare this by passing sulphuretted hydrogen through a solution of cobalto-cyanide of lead, by filtration, then evaporate and crystallize. White fibrous, acidulous, deliquescent crystals; soluble in water; with the metals it forms compounds called cobalto cyanides.

HYDROFLUORIC ACID.—This is an acid compound of fluorine and hydrogen, and was first discovered in a pure state by Gay

Lussac in 1810. It is a colorless liquid below 50° F when preserved from the air, but on exposure soon evaporates in dense white fumes. Its affinity for water exceeds that of sulphuric acid, and its combinations with that fluid is accompanied with a hissing noise, and a considerable increase of its specific gravity up to a certain point. It readily dissolves glass and silica, forming fluosilicic acid, for which reason it cannot be preserved in glass bottles; bottles of lead are hence generally used for this purpose, but silver and platinum are more suitable materials. It is highly corrosive, instantly destroying the skin wherever it comes in contact with it,

* Continued from page 150, Vol. 4, No. 3.

producing deep and serious ulcerations. Its vapor is pungent, irritating and irrespirable. It unites with the metals, and forms hydro-fluorates, fluorates, and metallic fluorides.

It is prepared by pouring concentrated sulphuric acid upon half its weight of fluor-spar, which must be carefully separated from silicious earth and reduced to fine powder. The mixture must be made in a large *lead*en retort, and a gentle heat applied, when the hydrofluoric acid gas will be evolved and must be collected in a leaden receiver surrounded with ice.

Hydrofluoric acid is used in the arts for etching on glass, and by daguerreotypists for accelerating the exposition of the plate in the camera. It is generally added to bromide of lime until the mixture assumes a very light orange, almost a lemon color. It reduces the time in the camera very materially, and renders a clear grey tone to the picture, but we question the propriety of its use, principally from the fact, that it is very apt to destroy the lenses, and, we think, gives a cold aspect to the daguerreotype.

HYDROTELLURIC ACID.—A peculiar gaseous body discovered by Davy. It is formed by digesting muriatic and on an alloy of tellurium with zinc or iron. Its acid properties are feeble; it is absorbed by water and then forms liquid hydrotelluric acid. It precipitates tellurets from metallic solutions.

HYPOCHLOROUS ACID.—This is easily prepared by agitating one part peroxide of mercury and two parts water in a glass bottle filled with chlorine gas; then filter. The filtered liquid is fluid hypochlorous acid. It may be purified by distillation at a temperature considerably below 212° as at that heat it suffers decomposition. It bleaches powerfully, and is readily decomposed by light and contact with various substances, especially powdered glass or angular bodies.

HYPOSULPHOBENZIDIC ACID.—A sour liquid, or crystal, obtained by decomposing hyposulphobenzidate of copper by sulphuretted hydrogen. It forms salts with the bases termed hyposulphobenzidates.

HYPOSULPHOBENZORIC ACID.—Accurately precipitates a solution of acid hyposulphobenzorate of baryta with sulphuric acid; filter, evaporate, first over the open

fire, and then in vacuo over sulphuric acid. It is crystalline and deliquescent, and forms salts called hyposulphobenzates. The acid salt of baryta may be made by conducting the vapors of dry sulphuric acid into a dry receiver containing crystals of benzoic acid, and placed in a freezing mixture. As soon as a transparentness is formed, dissolve it in water, decant the clear portion, neutralize with carbonate of baryta, evaporate, and add some muriatic acid when crystals will form as the solution cools. It may be decolorized by animal charcoal and purified from muriatic acid by repeated resolutions.

HYPOSULPHURIC ACID.—This acid was discovered by Weiter and Lussac. It is made by passing a stream of sulphurous acid gas through water containing finely powdered peroxide of manganese. Part of the peroxide combining with some of the sulphurous acid forms the hyposulphuric acid, part of which remaining in combination with sulphurous acid forms the hyposulphuric acid. The sulphuric and hyposulphuric acids both remain in combination with the oxide of manganese, from which, by the addition of baryta, the oxide is precipitated, as is also the sulphuric acid, as a sulphate of baryta, from which the baryta may be separated by sulphuric acid carefully added, the sulphate of baryta falling down, and hyposulphuric acid remaining in solution. By the application of heat a little above 202° it is resolved into sulphuric and sulphurous acid. It forms soluble salts with baryta, strontia, lime, and the oxide of lead, which distinguishes the compounds of this acid from those with sulphuric acid. It is inodorous and reddens litmus paper.

HYPOSULPHUROUS ACID.—This compound may be prepared by digesting sulphur in a solution of any sulphite; by this means the two equivalents of oxygen in the acid, combining with an additional proportion of sulphur, are converted into two equivalents of sulphurous acid. It can also be formed by passing a stream of sulphurous acid into a solution of the hyposulphuret of lime or strontia. In this case the sulphurous acid parts with half its oxygen to the hydrogen, of the sulphuretted hydrogen, whilst the remainder of the oxygen unites both with the sulphur of the sulphurous acid and of the sulphuretted

hydrogen to form hyposulphurous acid. Hyposulphuric acid cannot exist in a free or separate state, being resolved as soon as liberated from its base into sulphurous acid and sulphur. It forms salts with the salifiable bases which are soluble in water and it has a very powerful affinity for the oxide of silver uniting with it in preference to soda, forming a very peculiar characteristic feature, as this is the only mixture where a fixed alkali is separated from its acid by a metallic oxide.

IODIC ACID.—Is prepared by pouring 400 grains of muriatic acid or 100 grains of chlorate of potassa, in a tubular retort—the neck of which has a few grains of chloride of calcium in it, which is attached to a thin glass receiver containing 40 grains of iodine. By the application of heat, protoxide of chlorine is generated, which passing into the receiver comes in contact with the iodine and gives out both heat and light. The iodine combining with one portion of its oxygen, forms iodic acid; the rest unites with the chlorine and forms a compound, which is easily separated from the iodic acid by a gentle heat. Iodic acid is a semi-transparent solid substance, having an acid, astringent taste, and is decomposed when heated to 390° . It reddens and then destroys vegetable blues, is deliquescent and soluble in water. Its salts are termed iodates, which have the property of decomposing water, and detonating with inflammable substances.

IODOSALICULIC ACID.—A dark brown fusible mass, obtained by distilling a mixture of iodide of potassium and chloro-saliculic acid; or by dissolving iodine in saliculic acid.

IODOSULPHURIC ACID.—Drop sulphuric acid into a hot concentrated aqueous solution of iodic acid as long as a precipitate falls. When strongly heated it sublimes and is decomposed, but by means of a gentle heat, gradually applied, crystallizes in yellow rhomboids as it cools. This acid acts with great energy and dissolves gold and platinum.

IODOUS ACID.—To prepare this, take of chlorate of potassa and iodine equal parts; triturate together until reduced to a homogeneous yellow mass, then heat the mixture over a spirit lamp, in a glass retort connected with a spacious receiver, until va-

pours cease to arise. The oily liquid in the receiver is the iodosous acid. This acid reddens litmus paper, is volatile at 112° F., and freely dissolves iodine.

MOLYBDIC ACID.—Digest finely powdered sulphuret of molybdeum ore in nitromuriatic acid until completely decomposed, then briskly heat the residue. This acid is soluble in 570 parts of water; dissolves in the alkaline molybdates, from which it is again precipitated by strong acids. It reddens litmus paper.

PERIODIC ACID.—A new acid, resembling perchloric acid. It is obtained by mixing pure soda with a solution of iodate of soda, saturating the solution with chlorine gas, collecting the peruvellent white salt that falls, either at once or after concentration, dissolving in dilute nitric acid, and precipitating with nitrate of silver, when a periodate of silver is formed, from which the acid may be obtained.

PRUSSIC, OR HYDROCYANIC ACID.—This is a powerful acid formed by the combination of cyanogen and hydrogen. Take a tube 18 inches long and half an inch in diameter, one end of which is drawn out and bent at right angles, to which is attached a small flask or bottle, to be kept extremely cold with ice, and introduce into it a small quantity of bicyanide of mercury coarsely powdered; a few pieces of carbonate of lead may be previously introduced, and after the bicyanide has been put into the tube, a few fragments of the dry chloride of calcium may with advantage be put in also. Into the open extremity must be introduced a bent tube attached to a bottle or flask, containing ingredients for the extrication of sulphuretted hydrogen gas. When the joints of the connecting tubes, bottles, &c., are well luted and otherwise secured, the gas may be allowed to come in contact with the bicyanide of mercury; this will in a few minutes become black, the change which takes place being the sulphuretted hydrogen uniting with the mercury, forms the bisulphuret of mercury, and liberates cyanogen, which immediately unites with the hydrogen set free from the gas, and forms the hydrocyanic acid. The gas bottle being now separated, and the extremity of the tube securely closed, the flame of the spirit lamp must be passed along the underpart of the tube, until the acid be made to

pass into the cold receiver, when the vapor frequently condenses into a solid form.

Prussic acid is a verulent poison and should be very cautiously experimented with, as it is apt to produce dangerous consequences. One drop introduced into the throat or applied to the skin is often sufficient to cause death, and the vapor is equally injurious to life. It has a strong penetrating odor, similar to the peach blossom; is a limpid fluid like water; it evaporates rapidly, has a very slight affinity for the alkalies; suffers decomposition, sometimes in a few hours, and combines with water and alcohol. In every proportion this vapor detonates with oxygen, forming carbonic acid and nitrogen.

In cases of poisoning by this acid, a solution of chloride of lime in doses of two or three spoonfulls diluted with water may be taken frequently, and applied externally; or small quantities of ammonia water diluted with 10 or 12 parts of water. Unfortunately, however, the operations of the poison are so rapid that life is extinct before antidotes can be applied.

SULPHURIC ACID.—This acid, which has been known ever since the 7th century, is made by bringing the fumes arising from the slow combustion of sulphur into contact with those evolved from a mixture of nitre and oil of vitrol, so that the former becomes oxidized at the expense of the latter. The process is conducted in a series of leaden chambers, having a little water on the floor to absorb the acid, and so arranged as to prevent the loss of the gas. It is only prepared on a large scale. The theory of the process is as follows:—One part of sulphur combines with three parts of oxygen, from the nitric acid forming sulphuric acid, which unites with the potash and liberates the deutoxide of nitrogen, which flies off into the atmosphere of the room, where it attracts ten more equivalents of oxygen and becomes nitrous acid. The sulphate of potash remains in the vessel employed for the purpose of burning the mixture in.

Each of the remaining proportions^o sulphur absorb from the atmosphere during their combustion two equivalents of oxygen and becomes sulphurous acid gas; the nitrous acid gas and sulphurous acid coming in contact unite and form a crystalline mass, which falling down is decomposed by the water. Every two equivalents of the sulphurous acid takes two equivalents of oxygen from each equivalent of nitrous acid and form two parts of sulphurous acid, which is dissolved by the water, and the deutoxide of nitrogen again escapes to furnish more oxygen to the remaining proportions of sulphurous acid. The water, when highly saturated with acid, is then concentrated by boiling in leaden vessels to expel a part of the water, and finished by distillation in large glass retorts from a sand bath.

Pure sulphuric acid has an oily appearance, is transparent and colorless; is odorless and extremely acid and corrosive. It absorbs water from the atmosphere rapidly and combines with it in all proportions. When swallowed it is a corrosive poison, but its action may be checked by doses of chalk, whiting, magnesia, and carbonate of potash or soda.

SULPHUROUS ACID.—This acid is always formed when sulphur is burned in dry atmospheric air, or in oxygen gas; but it is generally prepared by acting upon sulphuric acid by means of some metal which takes away from the acid a portion of its oxygen. As for instance; put about 200 grains of mercury into a small glass retort with a narrow neck, over which pour 3 drachms of strong sulphuric acid and apply heat to the mixture. The gas which escapes must be collected over mercury. It is a pungent and suffocating gas, and may be liquified by a pressure of two atmospheres. It cannot support respiration nor combustion. It unites with the bases forming salts, which becomes sulphates by exposure to the atmosphere.

THE COLLODION PROCESS IN PHOTOGRAPHY

FOR THE PRODUCTION OF INSTANTANEOUS PROOFS.*

BY ALPHONSE DE BREBISSE.

Translated from the French by Mrs. A. L. Snelling.



It is in attending particularly to the coating of collodion upon the glass that we shall be able to ascertain if its density is too considerable. I shall return to this subject when

I come to speak of the silver baths.

It is always better to employ mirrors to extend the coating of collodion than ordinary glass plates.

However, the choice is of less importance than for albumen.

Collodion dries easily, thickens promptly, and is not subject like albumen to depose itself with more thickness in parts, so as to form channels upon the plate of glass.

I have made very good proofs upon half plates, and even upon whole plates of 23 inches in length, and 18 in breadth by employing the ordinary white glass, but of the smoothest possible kind.

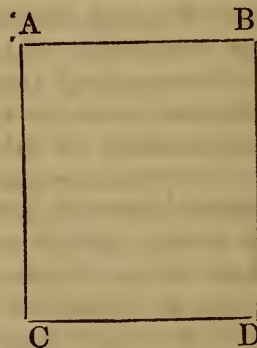
The plates ought to be at first washed with water, if they have already been used several times, the water should be acidulated with a certain quantity of azotic acid. This means cleanses perfectly by carrying away all deposits of silver which may have been formed. We finish by wetting the plate with some drops of alcohol which we rub upon it with a linen cloth until it is dry. Some persons precede this last wash by scouring with a little tripoli.

The plate well cleaned and without any trace of dust, is then laid horizontally, to receive the coating of collodion, which is deposited by means of a flask which encloses it.

Certain operators rest the plate upon the fingers of the left hand while the flask is held in the right. This method is not without danger; the heat of the fingers drying the collodion in the points that are heated, produces spots on account of the inequality of sensibility which results from

it; others stick upon the back of the plate a piece of Indian rubber or gummed paper. I prefer using a kind of mandril, very simple in construction. I take a plate of glass or of slate, under which I glue a piece of square wood which acts as a holder; upon the top of the glass I hold a slight stuff such as calico; the borders of which turned and adhere underneath. It is upon this mandrel, which should extend all around the plate which it supports that I place my mirror. By moistening the calico a little the mirror adheres in a manner not to slide, even in an inclined position.

The better to understand thoroughly the best means for spreading the collodion, the most important and the most difficult of this process, I shall indicate the mirror plate by the letters A. B. C. D.



A. C. designates the left border of the plate. B D the right border, the side C D being nearest to the operator.

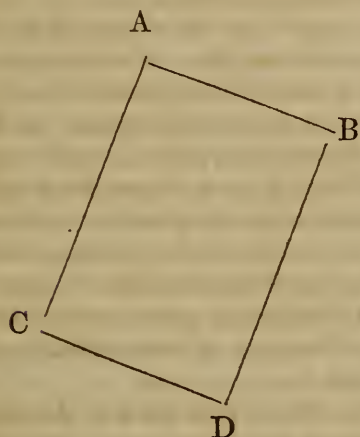
The left hand holding the mirror leaned horizontally upon the mandril, the right hand conveys to the middle of the plate a certain quantity of collodion contained in a flask with a large aperture. We should first be careful to clean the neck of the bottle, so that any strange substances contained in the liquid do not become fixed in the coating and make indelible stains. In case of a like defect, do not hesitate to clean the mirror as recommended.

Collodion placed upon the middle of the plate extends to the borders; besides, we facilitate the equal diffusion of the liquid

* Continued from page 168, Vol. 4, No. 3.

by inclining the mandrel in various ways. According as I lean it the angle is left bare, and prevents the coating from taking place. I will explain this more fully when I come to speak of the silver bath.

As soon as the coating covers the plate we arrange it as in A, by placing the angle D in the neck of the flask, into which we can drain off the excess of liquid. The position of the plate is thus—



When we see a multitude of little ridges forming upon the coating, they should be destroyed, as they will have a very disagreeable effect, since they will be reproduced upon the positive proof. We can cause them to disappear by reversing the plate alternately from A to D and from C to B, moving it very rapidly until they entirely disappear. If this experiment is performed before the furrows have become hardened, they will be effaced, and the coating become even. If they remain it will prove that the coating is too dense, and it will be necessary to add ether to produce the desired effect.

When the ridges are very prominent, it often happens that the spaces which separate them present, at the time of the drying of the proof, bands pierced all over with little holes as a kind of net work. The contraction of the collodion in drying, produces probably the film which thus wanting thickness in the approaching points of these kinds of ridges, splits in the most vexatious manner.

If, on the contrary, the collodion has not sufficient consistence, when we come to place the plate of glass which is coated with it in the bath of silver, the film will be divided and seem to be dissolved in different parts. We obviate this in-

convenience by adding to this too extended preparation a certain quantity of thicker collodion of which we ought always to have a flask in reserve.

M. Fry has proposed a means of giving to collodion a consistence equalling at least that of albumen. It consists in adding to the preparation I have just described, a portion of ether in which has been dissolved some gutta percha. I have tried it with success; some fragments of gutta percha in leaves, put to macerate in some ether, is dissolved sufficiently for this end, although it seems that the ether has not attacked them. A bed of collodion with this addition, presents, after the drying, a very remarkable solidity analogous to that of albumen.

M. Fry pretends that the photographic collodion, preserved in a flask of gutta percha, acquires sufficient solidity by this contact. This consistence is so much more precious, as it does not contribute to augment the ridges that we ought to fear; its solidity not being well established till after the drying of the finished proof.

The collodion prepared with the requisite conditions can be preserved till it is exhausted, by taking care to keep it in a flask well closed, and by decanting it anew if any deposit is formed at the bottom. It can be easily understood that the action of pouring and especially of pouring back the excess of a proof into the flask will not delay to make its deposit float in the liquid and will effect the clearness of the film.

SENSIBILITY OF THE PLATE COATED WITH COLLODION.

The sensibility of the film of collodion is obtained by plunging the plate into a bath of silver thus composed—

Distilled water,	60 grains,
Azotate of silver,	4 “

We put this solution into a basin of porcelain, or better in a plate formed by a plate of glass surrounded by a border projecting a few lines above its surface. We place the prepared glass before the coat is dry, standing on the interior border of the basin, then by means of a hook which holds the upper part of the plate, we let down the latter at a single stroke, unhesitatingly, so as to put the film of collodion in contact with the liquid by completely

submerging it. We soon see this film whiten and become milky in consequence of the formation of iodine of silver; it is necessary to prolong this bath from one to two minutes and not to withdraw the plate until an oily aspect which the collodion at first presents, has disappeared, and the liquid shows freely upon the surface.

If, at the moment of the immersion of the plate in the silver bath the film of collodion should not whiten quickly enough, it will show that the sensibility is not sufficient, and the proportion of the iodine is not great enough. We ought then to add to it some iodide of silver rather than of iodide of iron whose effect is less constant.

The alcoholic solution of iodide of iron, at the moment when we mingle it with collodion, has a coagulating property which contributes to give more body to the liquid, but I know not that this advantage would be durable, and I have more confidence in the preparations of silver as much more constant than those of iron.

It is not necessary, to have a great sensibility, which is not indispensable, to add too strong a dose of ioduret, because the film would be more granulated, and would give a proof having less transparency and fineness. If we would have an animated scene, such as the sea, with its waves and vessels, a public square on a market day; a procession, etc., it is necessary then to depart from this principle and to augment the dose of iodurets, principally of the ioduret of iron, with which we easily obtain instantaneous impressions.

When we wish to enfeeble the density of the collodion, we had better dilute it with ether than with alcohol which renders the stereotype more opaque.

I return to the importance of not waiting till the film of solution is dry to bathe it in the collodion of silver; it would be then without sensibility. We must choose the moment when the plate, well drained, begins to take an aspect a little dead by the evaporation of the ether.

As I write principally for persons already familiar with photography upon glass, I believe it useless to say that the operation of the sensibilisation of the plate ought to be made in the shelter of the light in the same manner as the following:—I

found it best to labor in a dark closet whose window is furnished with some squares of glass of a yellow orange color, covered by a black curtain, removed as necessity requires.

The hook of silver or gold of which use is made for the albuminated glass, are not as convenient for the collodion plates whose film they too easily tear. I prefer hooks of horn or whalebone as it can be easily cut by warming the ends.

It has doubtless been remarked that I do not extend the film of collodion upon one of the corners of the plate of glass. This is in order to place at this point the hook, when we lower the plate into the bath of silver, without danger of *touching* the film which easily is raised when it is detached in any part. It is important, when, if during the operation we take the plate between our fingers, to take care not to destroy the adherence of the collodion upon the borders.

I wish to say here a word of the bordered plate glass which make excellent basins for the silver baths; they waste less liquid and their very uniform surface cannot bruise the sensible films in any point. Nothing is easier to construct. We take a plate of glass of the desired dimensions and we glue upon the borders a frame of thick bands of glass cemented together by means of quick lime diluted in the white of an egg.

To have the albumen easy to spread and to mingle with the lime it is necessary to beat the eggs to froth and take the liquid which runs from it. This sizing takes very quick and is of a great solidity.

We have recommended for the bath vertical glass basins, not very thick, in which we are more sure of plunging the plates without fear of arresting the operation.

M. Archer has invented an analogous basin of a cuniform shape, which allows of leaving the plunged plate in the argenti-ferous liquid even during the exposition in the dark chamber, a peculiar frame having been constructed for this purpose. This does not seem to me very practical, especially for the larger dimensions, and I do not know if it can be said that M. Archer has had *for this reason* a very happy idea.

NOTE.

Rules to be followed in the employment of the collodion prepared by M. Archer, for obtaining positive and negative proofs instantaneously.—*Extracted from a communication of M. Storne to M. Robert Hunt, and published in the LONDON ART-JOURNAL, July 1851, No. 157.*

Collodion, as all the world knows, is a solution of gun-cotton in ether, and for the preparation of which there is a difference of opinion, it contains a small quantity of the ioduret of silver, dissolved in the ioduret of potassium. This solution is sufficiently fluid to run freely upon a plate of glass when it is turned down. We should add ether until this condition is secured. If the collodion is too thick, we shall experience a great difficulty in obtaining an equal film. But when there is the right consistence, we can cover with it the largest plates.

This is the method we have adopted:—Take a bit of plate glass of the size of the sash of your dark chamber; after having well washed and dried it, hold it by one of the corners, or if it is large, take it upon a level support; pour upon the centre of the plate a sufficient quantity of prepared collodion which will immediately extend itself equally upon the surface. Immediately pour back the liquor into the bottle by one of the corners, then lowering the hand which holds the raised plate, so that the liquid runs by the lower border, without quitting the neck of the flask, the ridges which have shown themselves, are opposed by other *stries*, so that the surface of the film will become plane and uniform. A little practice will soon obtain this result. Then the plate, before the ether shall be entirely evaporated, is immediately plunged into a bath of nitrate of silver of thirty grains for one ounce of distilled water until the oily appearance, which is remarked at the moment of immersion has disappeared, and the solution of silver runs freely over the surface of the collodion. The plate ought now—being still moist—to be placed in the dark chamber to receive the image. The time of the exposure varies materially with the light, but for a portrait and with a lens of a moderate quickness, from three to thirty seconds will be necessary. Mr. P. W. Fry, who first employed collodion, obtained beautiful portraits by placing in the open

air and opening the top of the lens and shutting it as quick as possible.

The agent for developing the image is pyrogallie acid, which was recommended by M. Archer. I have heard that the protonitrate of iron produces the same effect.

The solution of pyrogallie acid should be as follows:—

Acid pyrogallie,	3 grains,
Acid acetic crystallisable,	1 drachm,
Distilled water,	1 ounce.

The plate, when taken from the dark chamber ought to be placed, the sensitive film downwards, upon a level support. It will then be covered with a sufficient quantity of this solution and the image will immediately be developed.

We can, at need, agitate the plate a little, to avoid the deposits which might spot it.

When the weather is dull, some drops of nitrate of silver, five grains to an ounce of water can be added to the pyrogallie acid, before pouring the solution upon the plate, but in clear weather the image will be sufficiently developed with the pyrogallie acid alone.

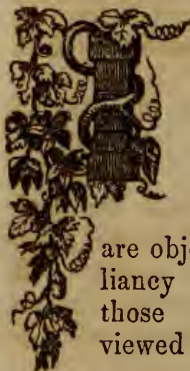
The development can be judged of by placing from time to time a morsel of white paper upon the plate, and as soon as the proof is intense enough, the solution should be poured off, and the plate washed by means of a light course of water. A saturated solution of the hyposulphite of soda should be afterwards spread upon the surface, which will instantly destroy the ioduret not decomposed, and fix the image. The water must be poured on again to clean the plate of the hyposulphite, and the proof will be finished.

In this case the proof is more or less negative by transparency, or positive by reflection of the light. I have found that we can have very beautiful and positive proofs by simply adding a little nitric acid to the solution of pyrogallie acid, but care must be taken not to add too much. I have also obtained purple and green proofs, the first by adding acetate of lead, the second with acetate of lime and ordinary gallic acid. The proofs so executed can be treated as negatives and reproduced by the methods employed to obtain positive images from negative papers.

TO BE CONTINUED.

PHOTOGRAPHY APPLIED TO ASTRONOMY.

TRANSLATED FROM THE FRENCH OF LA LUMIERE, BY MRS. A. L. SNELLING.



N photography, besides the difficulties of the weather, are those of space, which remain to be vanquished. Supposing substances prodigiously sensible are prepared by chemists, there are objects so feeble in their brilliancy that their impression on those substances could not be viewed by the eye. If such objects are near us we can easily throw upon them a more vivid light; but this is not the case with those millions and millions of leagues distant. There are, however, myriads of bodies, distant from the earth, which present aspects and peculiar characteristics of which science would gladly have an exact representation. The moon, for instance, which is 80,000 leagues from us, carries on its face traits of a marvellous complication and delicacy, which have a strange significance, relatively to its present form and past history. But the moon receives about as much solar light upon a given portion of its surface, as an equal portion of the terrestrial surface exposed to the rays of the sun. But much less of this light rarely comes to us, because it has 80,000 leagues to travel before arriving to us, and it is always more diffused and more enfeebled in proportion as it is distant from the lunar surface. The effective light of the moon is hardly more intense for us than that of a taper placed at the distance of twelve feet. It is 800,000 times less than that of the sun.

The enlightening power of the moon being so much inferior to that of the terrestrial objects exposed to the solar rays, we have always thought it would be impossible to obtain a photographic image of it. A single consideration, however, led us to hope for a reproduction—certain optical instruments permit us to draw a great quantity of light from objects very feebly illuminated. An object seen across a lens of three miles of diameter gives 144 times more light than when we see it with our naked eye; consequently, the image of

this same object formed in a camera-obscura by means of such a lens, must be 144 times more luminous and more distinct, than when it is reproduced in the interior of the eye, and this vapor of the image augments in the exact proportion to the dimensions of the object-glass.

Struck by this consideration, Dr. Bond of Harvard University, U. S. A., thought that although it were impossible to render the moon,—so pale and distant—more luminous, he could make the feeble light she possesses useful for photography, if he could make a gigantic camera-obscura of the magnificent telescope which he had at his disposal. The object-glass of the telescope is 15 inches in diameter, and the image of an object formed at its focus is 25 times more brilliant than the image of the same object reproduced by a lens of three inches. Mr. Bond tried the experiment. He placed a plate of iodised silver in the dark tube of the telescope, so that the sensible surface of this plate corresponded to the focus of the great achromatic object-glass, and he caused the telescope, thus prepared, to follow the movement of the moon in space, by means of one of those ingenious mechanisms that are employed for this effect in observatories. The result of the experiment was a veritable triumph.

Three excellent proofs, reproducing the least details of the moon, were presented at the last meeting of the *English Association* for the progress of science.

The most interesting of these proofs is a sort of portrait of the moon in profile, if we can say so, of the dimensions nearly of a half five franc piece. This position of the moon was chosen, because the elongated shadows that project from the inequalities of the surface, are seen most advantageously.

When we look at the lunar atmosphere, half in light and half in shade, the sun shines on it in a transverse direction to that in which we are looking. For example, when we have this hemisphere face to face, the sun strikes it from right to left, and the shadows are spread out in all their

extent before our eyes, and how marvellous are these shadows observed with a telescope in certain circumstances. Fringes of darkness casting themselves off behind the peaks and summits of silver, rounded waves of shadow filling up cavities in the form of hollow cups as abysses in the midst of this strange surface; triangles of jet shooting forth like twigs from under luminous spots, brilliant as diamonds,—this is what the telescope displayed. In the photographic image produced by Dr. Bond, all these details are revealed to the eye. Everything there is so completely and so faithfully reproduced, that by the aid of a magnifying glass we perceive new objects, minute details that had escaped the sight. The revelations of the microscope in this proof are as strange and numerous as the revelations of the telescope in the moon itself.

This time, art seems to have approached near perfection, in the copy of a model which is one of the most astonishing master-pieces of nature.

The light which we receive from the fixed star is some 28,000 times less than that which we receive from the moon. But this light is uncertain upon a point almost invisible, instead of being spread upon a great surface. It is then very probable that when the most sensible photographic surfaces have been found, and we can employ object glasses as large as the great reflector of Harvard University, some proofs representing groups of stars can be obtained. Mr. Bond has announced at the meeting of the British Society, that his father had already succeeded in producing, even on a plate of iodised silver, a distinct image of the two constituents of the star Ester. It is impossible to calculate the services that photography is called to render to astronomy. Research for planets and other bodies wandering in the firmament has been conducted until now, in the laborious method of registering the place of each visible luminous body, every time that it appeared in the field swept by the telescope of the observer, so that subsequent com-

parisons can show if, in the great celestial multitude, any one has changed its position. When, in 1846, professor Challis undertook the search for the planet Neptune, according to the calculations of M. Adam, he registered 3150 positions of stars.

The fourth night of his observations, the 12th of August, he saw the planet without recognising it; but afterwards he remarked that there was a star there where none had been the second night, 30th of July. If a photographic chart of the region of the heavens had been made on the 30th of July and another the 12th of August, M. Challes, in comparing them, would have certainly discovered the planet six weeks before Dr. Gall. Dr. Gall received the calculations of Levossier upon the probable place of the planet on the 22nd of September, and found it on the 23rd, because he had a stellar chart of great exactness, that of Bremisar, who aided him in recognizing the changes supervening in the sky.

Photographic charts of the stars frequently renewed, would certainly give to astronomers the means of discovering all the bodies wandering in space and yet unknown; and we do not doubt that the number of them may be considerable, and worthy of serious attention, when we remember that the number of the planets has grown from 4 to 30 in the space of six years.

We know already that the light of some stars differ from that of others. Wollaston and Kranuchofer have demonstrated that different spectra were produced when the rays of different stars were made to pass by the same polarizing medium. Very probably photography will afford the means of seeking the cause of this difference. Perhaps we shall find substances sensible to one kind of light and insensible to others. If every star which shines in the heavens does not impress its image upon the same sensible surface with equal facility, photography can then *ask some questions of nature*, in the Baconian sense, and obtain from her responses that no other would know how to draw from it.

PHOTOGRAPHY.—ITS ORIGIN, PROGRESS, AND PRESENT STATE.*



THE production of positive pictures of the first operation in the camera was the next subject which claimed attention. A darkened photographic paper was washed with a hydriodic salt, and placed in the camera; here it was bleached by the solar radiations, and the image produced had the lights and shadows correct as in nature. Dr. Fyfe and Mr. Robert Hunt were the most successful operators. The latter gentleman published some papers in the "Philosophical Magazine," in September and October, 1840, on "the use of the Hydriodic salts as photographic agents." This variety of picture, and papers prepared for obtaining them, were sold by Messrs. Ackerman and Co.: and Sir John Herschel says, in the memoir already quoted, "a positive paper of this nature is actually prepared for sale by Mr. Robert Hunt, of Devonport." Such is the evidences which our researches enable us to give in relation to the use of iodised paper, before the date of the calotype patent under which the extensive privilege of employing "iodised paper" was claimed. This calotype patent is dated 1841, and involves the use of *iodised paper*, of gallic acid, acetic acid, and particularly *the development of a dormant image*. That we are indebted to Mr. Fox Talbot for the Calotype no one will deny; and that gentleman has now given his process to his countrymen as a free gift, which will be received with all due honor. The discovery appears to have been one of those which the world are fond of classing, much too commonly, under the term of accidental discoveries. We are not ourselves believers in accidents in science, since the mind of the observer must be previously prepared to receive and improve the fact observed, and this necessarily removes it from the condition of accident.

Mr. Talbot was engaged in a series of experiments with various chemical compounds, his object being to increase the

sensibility of his preparations, and among others gallic acid was employed. Some papers upon which no impression was visible were thrown aside, and on these there were afterwards discovered well-defined images which had developed spontaneously in the dark. Investigation now established the important use of the gallic acid, and the manipulatory details of the Calotype process undoubtedly were the invention of Mr. Talbot. When the early examples of these pictures were circulated amongst the scientific men of this country and of the Continent, they created no small sensation, although the pictures then produced were exceedingly inferior to those now obtained. Mr. Fox Talbot had an undoubted right to patent his invention, and appropriate to himself all the profits which might arise from any commercial transactions, either by himself or his licenses. The questionable character of this patent, as of the daguerreotype patent, consisted, as it appears to us, mainly in its imperfect nature. Mr. Fox Talbot still reserves his right, as far as taking portraits for sale is concerned; but this affects the public little, as the daguerreotype and Collodion portraits are far superior to those produced by the patent process. As specified, it is not easy to use the Calotype for portraiture, or, indeed, for any purpose requiring much rapidity of action; and it was not until the process was fully developed by Mr. Cundell, in a paper published in the "Philosophical Magazine" for May 1844, that much progress was made in this direction. In the same way, when Daguerre gave up his process to the French Government, it required a period of twenty minutes to produce a picture. In 1839, Mr. Towson published his views, and suggested the use of large lenses, and the adjustment required to bring the sensitive surface into the chemical, as distinguished from the luminous focus; and Dr. Draper, of New York, in 1840, by adopting these suggestions, obtained the first daguerreotype portrait. In this year a vastly increased sensitiveness was obtained on the daguerreotype plate by the discovery of Mr. Goddard, and of Mr. Claudet, that the iodine va-

* Continued from page 163, Vol. 4, No. 3.

por combined with bromine or chlorine, offered a chemical surface of the most unstable character, which was consequently disturbed by the slightest influence of the sun-beam. Thus, in both instances, the processes remained unprofitable as they came from the inventors. Eventually, by the scientific investigation of others, they are improved. The utmost obstruction was given to the progress of the art by the patents, since few parties were disposed to waste time in investigations from which they could reap no advantages to themselves, and from which the public would derive no benefit. In 1844, at the York meeting of the British Association, Mr. Robert Hunt published the use of sulphate of iron as a developing agent—now so commonly employed—and Dr. Woods, of Parsonstown, communicated his process called the “Catalysotype,” in which the iodide of iron is an active ingredient. At that meeting the merits of these processes were fully discussed, Mr. Talbot being present, and acknowledged their importance.

The next step in the way of improvement was the use of albumen upon glass plates. M. Niepce de Saint Victor, published his mode of applying this organic body to glass, in the “Technologist,” in 1848. The most successful operators with this material in this country are Messrs. Rose and Thompson of Edinburgh, in whose views of the picturesque city we see realized the production of fine middle distances and those half-tones which it is so unusual to meet with in ordinary Photographs. An attempt was made to patent the use of glass in this country, but that was defeated by a well-devised application for a counter-patent. Glass plates were first employed by Sir John Herschel, in 1840. He precipitated chloride, iodide, and bromide of silver on the glass, and obtained very well-defined images, and he then described the conversion of *negative* into *positive* pictures, which has not long since become the subject of a patent. Sir John Herschel’s words are, “Exposed in this state to the focus of a camera, with the glass towards the incident light, it became impressed with a remarkably well-defined negative picture, which was direct or reversed, according as looked at from the front or back. On pouring over this

cautiously, by means of a pipette, a solution of hypo-sulphite of soda, the picture disappeared, but this was only while wet; for, on washing in pure water and drying, it was restored, and assumed much the air of a Daguerreotype when laid on a black ground, and still more so when smoked at the back, the silvered portions reflecting most light, so that its character had, in fact changed from negative to positive.

We need not detail the peculiarities of the more recent patents of Mr. Fox Talbot: porcelain plates form the subject of one of them, but these we believe have never been employed; and the difficulties of their manufacture are so great that there is little probability of their ever being useful to the photographer. In the last patent we have a combination of the sulphate of iron, producing a very decidedly instantaneous action. In a letter from Mr. Fox Talbot, published in the *Athenæum* of December 6th, 1851, we read:—“In the process which I have now described, I trust I have effected a harmonious combination of several previously ascertained and valuable facts, especially of the photographic property of iodide of iron, which was discovered by Dr. Woods, of Parsonstown, in Ireland, and that of sulphate of iron, for which science is indebted to the researches of Mr. Robert Hunt. In the true adjustment of the proportions, and in the mode of operation, lies the difficulty of the investigations.” Mr. Talbot concludes his communication:—“I venture to recommend it (this process) to the notice of your scientific readers.” Here we have Mr. Fox Talbot’s own acknowledgment that he is indebted to two experimentalists for his process; he admits that the only thing he has done is to adjust the proportion. In this way a most serious check has been given to investigations of the greatest value. Sir John Herschel stopped in the midst of a series of the most valuable researches on the chemistry of the sun-beam; and Dr. Woods abandoned his promising enquiry, after some angry letters between him and Mr. Talbot in one of the Irish scientific journals. We have now disposed of the processes which are in any way connected with the English patents, of which we hope to hear no more. Mr. Talbot has resigned the rights which the patent laws of this country allowed

him to assume. Several of these patents would never have been granted had there been a scientific board to examine the merits of them, and test their originality. For a long time several gentlemen have been endeavouring to make terms with Mr. Talbot, and it is through their exertion that the patentee has been at length induced to make a reluctant surrender of his patents. They failed as a commercial speculation, as might have been expected they would do. Mr. Talbot made a great mistake; but now he has done his utmost to redeem that error by handing over to the public all his patents as a free gift. We hope the portraits will soon follow, and that the *TALBOTOGRAPHY*, as the Calotype process should now be called, will, in its freedom, advance to its highest pitch of excellence in this country. The use of waxed paper by Mr. Le Gray involved no new process, although we believe waxed paper may be used for several processes beside the Calotype. M. Le Gray has published a work on his modes of manipulation. M. Blanquart Everard has published several papers in which we have that perpetration of injustice which no feeling of nationality can justify. If the Frenchmen refer to the works of Mr. Robert Hunt or any of the smaller manuals which have been published in this country, they will find the utmost credit given to them for their labors. We believe no modification which has been devised by the photographers of the Continent is mentioned without the name of the inventor or improver. Now M. Le Gray never mentions an English name in his books, and M. Blanquart Everard coolly appropriates Mr. Talbot's processes, and accepts the honors of the Academy as the reward for his audacity. We have no desire to return evil, we therefore acknowledge that, after Daguerre, Fizeau, Becquerel, Niepce de St. Victor, Le Gray, and Everard have been most successful investigators of Photographic phenomena. On the Continent, every improvement has its full value, is very readily appreciated, and it is soon in the hands of the most skillful manipulators. The consequence is that Photography puts on an entirely different feature in Paris from what it does in London. In London, the trade being centred, up to this time, in the hands of three licensees, who are under obligations of the most stringent

kind, we are required to pay as many pounds for a picture as it costs shillings on the Continent. Wedgewood was the undoubted originator of Photography; and in this country, next in time, and the first in merit, as the originator of a most highly beautiful process, is Mr. Henry Fox Talbot.

We have said the Collodion process is not involved in any patent. It has no one agent in common with any of those included in the patents, except the iodide of silver, and this we have shown was employed long previously to the Calotype patent. Every step of the manipulation is dissimilar, and the surface of collodion on glass is absolutely new. To the zealous investigations, therefore of Mr. Archer, Mr. Fry, Mr. Horne, Dr. Diamond, and others, the public owe a debt of gratitude, as at least giving them one process for portraits which can be practised without fear of the law. The details of the Collodion process need not detain us, nor need we remark on the Chrysotype or the Cyanotype of Sir John Herschel, or the Chromatype of Mr. Robert Hunt, as the processes do not possess sensibility sufficient for us in the camera. We have sketched out the history in all truth of the processes which are available for the highest purposes of the art, and we have done so from the earnest desire we feel to place our readers in possession of the case as it stands, in all its fidelity.

The art of Photography has not, however, yet attained that point of excellence to which it must soon arrive. When some increase of sensibility allows of our diminishing the size of the aperture in front of the lens of the camera, and when we can operate with rapidity without actual sunshine, so as to avoid the contrasts between highly illuminated points and sombre shadows, and to obtain the middle tones and distances in their true degree of light and distinctness, we shall see effects which will far surpass those we now call beautiful.

With the advantages of the stereoscope, already fully described in the *ILLUSTRATED LONDON NEWS*, what may we not expect to see realized? Every scene hallowed to our memories by its associations with human progress, in all its varied phases, may be revived before our eyes in all the truthfulness of nature. From the East we may

copy the temples and the tombs which tell the story of a strange but poetic creed. Asyria and Egypt may disclose their treasures to those who cannot travel to survey them, in such a form that all doubt of authenticity must vanish. The harmonious elegance of the remains of Greece, and examples of Roman art, may thus be easily collected and preserved; and every time-

honored fane of Europe may be brought home and made to minister to our pleasures—instructing and refining our tastes, and teaching all the mysteries of the beautiful, behind which, as under the shelter of a zephyr-woven veil, we may survey all that is good, and gaze upon the outshadowing of the Divine.—*London Illustrated News.*

A NEW THEORETICAL AND PRACTICAL TREATISE ON PHOTOGRAPHY UPON PAPER AND GLASS.*

BY GUSTAVE LE GRAY.

Translated from the French by J. R. Snelling, M. D.

§ 25. PREPARATION OF ALBUMENIZED PAPER FOR THE NEGATIVE PROOF.



HIS same preparation of albumen and the same quantities apply also perfectly upon paper, but it requires great caution to have it equal.

The proof that is thus furnished is remarkable for the depth of its blacks and transparency of its lights. Almost all papers, when they are not too much spotted with black points, will serve art by this method and give good results.

I obtain also a delicacy of execution which is almost as well defined as the proofs on glass, and which is incontestably more artistic.

Pour the albuminous solution into a dish placed very horizontally, taking care that there is no froth.

Take the paper which you have chosen, and wet it on one side only, beginning at the edge of the dish which is nearest to you, and the largest side of the sheet, placing the right angle on the liquid, and inclining it towards you, move it forward in such a

manner as to exercise a strong pressure which will remove the air-bubbles.

Place before you a light so that you can perceive the bubbles and push them out if any remain.

Let the sheet imbibe two or three minutes at most, without touching it; then take it up gently, but at once, with a very regular movement, and hang it up by the corner to dry.

You prepare thus as many sheets as you wish in the same bath, taking care that there is always about a quarter of an inch in depth of the solution in the dish. Then place all your sheets, dried and prepared, one on the other between two leaves of white paper, and pass over them several times a very hot iron, taking out a sheet each time; you will thus render the albumen insoluble. The iron should be as hot as possible without scorching the paper.

I then make use of this negative paper exactly like the first paper named at § 8; only great attention must be observed that the immersion in the aceto-nitrate bath is instantaneous, and that the air bubbles are immediately driven out, for every time you stop, you will make stains the same as on glass. It is also necessary to heat moderately the gallic acid.

* Continued from page 169, Vol. 4, No. 3.

PREPARATION OF POSITIVE ALBUMENIZED PAPER.

§ 26.—One of the most essential services rendered by albumen to photography is, without doubt, its application to the preparation of positive paper, to which it imparts a brilliancy and vigor difficult to obtain by any other method.

Take white of eggs, to which add the fifth part by volume of saturated solution of salt (chloride of sodium) or what is better, muriate of ammonia; then beat it into a froth, as previously, and decant the liquid after it has settled for one night.

Pour out the liquid into a basin, and prepare your positive paper on one side only, by the same method as in the preceding chapter for albumenized negative paper. After leaving it for two or three minutes, dry it and pass the hot iron over it in the same manner as directed.

The paper thus prepared is extremely glossy. If you wish to obtain it less shining, before beating the eggs add more or less of distilled water, containing likewise a fifth of water saturated with muriate of ammonia.

You may thus modify at pleasure the degree of brilliancy of the proof. The proportion of half water and half albumen is excellent: it gives much fineness and solidity without presenting the appearance of a varnished proof. You may keep this paper some time before you apply the nitrate of silver to it, as it does not spoil.

Then put this albumenized side on a bath of nitrate of silver—one part of nitrate by weight, to four of distilled water—and let it imbibe four or five minutes; then hang it by the corner to dry, and finish it as I have described for the positive paper (§ 20.)

This paper gives much depth to the blacks, and great brilliancy to the whites. By leaving it a shorter time on the nitrate bath, about one minute, and using Whatman's paper, you may obtain a reddish purple tint very harmonious.

The Canson papers, and in general, all those containing much starch give black tints.

OBSERVATIONS RELATIVE TO TAKING VIEWS.

§ 27. When you wish to take a view, be careful not to make the image too large,

and that your perpendicular lines are true.

The distance from the object to be copied, should be about one quarter of the whole scene, if you would obtain a positive free from any distortion. When you wish to take the whole scene with a single lens, it is better to employ the half-plate size, and make the picture smaller.

It is also well to get at a convenient distance from the object to be copied, as it requires a longer time in the camera when the distance is great. Vegetation and all green objects generally require a longer exposure.

Care must be taken that the sun's rays do not strike upon the object-glass of the camera when taking a view, as it would interfere with the clearness of the image.

When you desire to operate in the country, it is quite necessary to carry with you every thing you may require for use.

The following list of articles compose my traveling apparatus.

Camera and Lens.

In the interior of the camera I enclose five bottles, of a square shape, as they take up less room. These contain respectively, aceto-nitrate of silver, saturated solution of gallic acid, distilled water, hyposulphite of soda, and a solution of bromide of potassium, to fix the proofs; one pipette, three funnels (one in the other), and three very shallow basins of porcelain, sunk in boxes of walnut wood, the inside of which is provided with gutta-percha, and which forms excellent basins for the washings.

In one of these basins I place my lining paper already wetted.

In the second I put all my negative proofs in the solution of bromide. In the third I have water in which to place my proofs when sufficiently fixed, and leave them until I return home, when I finish them by fixing with the hyposulphite of soda.

I have moreover two dishes, one for the aceto-nitrate of silver, and the other for the gallic acid. A tripod to keep the basins level, a portfolio containing the prepared paper.

Two or three quires of blotting paper to clean the slabs. A tripod stand to place the camera upon, the height of which should be sufficiently great for the object glass to reach nearly the height of the eye.

A short black cloth, sufficiently large to cover completely the machine, and so arranged as to form a kind of tent, under which I make all my preparations. In case of wind I fix the cloth to the ground with pegs. In one side of the tent I have an opening a foot square, covered with a piece of yellow material, which permits sufficient light to conduct the operation.

The box which contains all the apparatus serves me for a table. With the dry paper, the traveling apparatus for taking views is much simplified. It is sufficient to take with you the camera and stand, the tent, a box furnished with prepared paper, two porcelain basins, one bottle of gallic acid, one of aceto-nitrate of silver, one of bromide of potassium, and one of distilled water. You may even dispense with the trouble of carrying the basins and bottles since the proofs may remain a day or two before being developed after its exposition to light.

For long journeys, I have a second box which holds 20 bottles of 250 grains each, in which I put the chemical products which are necessary; a very close oaken box, containing 8 or 10 kilog. of hyposulphite of soda; three or four basins of equal size for making the hyposulphite baths; a small balance and weights; a graduated scale to weigh the liquids, and a frame for making the copies.

This frame consists of two thick glasses, kept in the frame by a groove. These glasses are covered by a wooden lid with hinge by the aid of which you can exert a gentle pressure on the glasses, having placed between it and the glasses a square of folded paper. As this frame can be opened behind, you can examine the proof without deranging it, and re-expose it to the light if the exposition were not sufficiently prolonged.

M. Troisgros, cabinet-maker, 93 Rue St. Germaine-l'Auxerois, also makes a very convenient frame for inspecting proofs during their drawing. I particularly recommend it to amateurs who will find it at the establishment of M. M. Lerebours and Secretan.

It was with this outfit that one of my pupils, M. Maxime du Campe, executed his admirable views in the deserts of Egypt.

List of chemicals necessary.

§ 28.—Virgin wax	500 grammes.
Iodide of potassium	100 "
Bromide of potassium	400 "
Chloride of sodium	500 "
Crystallized nitrate of silver	100 "
Crystallizable acetic acid	400 "
Crystallized gallic acid	25 "
Hyposulphite of soda	1 kilog.
Liquid Ammonia	100 grammes.
Muriatic Acid	100 "
Collodion	100 "
Spirit of Wine	500 "
Fluoride of potassium	50 "
Sugar of milk	500 "
Muriate of ammonia	500 "
Distilled water	1 litre.
Cyanide of potassium*	20 grammes

I get all my chemicals of M.-M. Veron and Fontaine, chemists, 8 Rue des Francs Bourgeois St. Michel.

THE OBJECT-GLASS.

The choice of a good object-glass is of the utmost importance for obtaining fine proofs. For the reproduction of landscapes and monuments, the single lens is superior. I find that a long focus is indispensable.

For portraits, a double achromatic lens is necessary. The double lenses (the German large plate size) give very good results, but centralize the light a little too much; for this reason also, they are more rapid in operation than ours.

In choosing for object-glasses of this kind, seek for those which give the image clear over the greatest possible extent (to the edges of the ground glass, and do not attach too much importance to its rapidity of action. An image is more beautiful when it presents a very clear aspect in its *tout ensemble* than when it is centralized, that is to say, very clear in the centre, and becoming gradually more indistinct towards the edges.

It is also necessary to satisfy yourself

* The cyanide of potassium is a very active poison, and should be employed with great caution; you may use it to remove stains made on the hands by the nitrate of silver, although you must especially guard against chaps or cuts in the flesh. Use it in the proportion of one gramme of the salt to ten of water.

that the chemical focus perfectly coincides with us as remarked by M. Claudet in his work on the principal phenomena of photography, published in 1850, and sold by Lerebours and Secretan, 3 Pont Neuf.

In a second very interesting memoir, which M. Claudet presented to the Institute, and which will soon be in circulation, he proves that the difference between the chemical and visual focus varies according to the color of the atmosphere; but these variations are so imperceptible that they may be neglected in practice. In this same memoir M. Claudet gives a description of two instruments which are very useful to photographers. One is the *focimeter*, which is used to determine whether the two foci in an object-glass coincide, and if they differ, how much, and in what respect. The other is the *dynactometre*, which gives very perfectly the relation of exactness, or the difference of rapidity which exists between two object-glasses.

I find that our French object-glasses answer perfectly well, and I use no other kind for my portraits. The focus is a little longer than in the German object-glasses, and the image is more uniformly clear. Yet you must be careful to order from a respectable house.

The half-plate size of M. M. Lerebours and Secretan are also remarkable for their great clearness and rapidity, and I recommend them to amateurs who do not wish to go to the expense of purchasing a large object-glass. They have given me very fine portraits and deserve the reputation which they possess. With a single lens for landscapes and monuments, and a double one for portraits, the amateur will have all that is requisite. If you wish to have the landscape very clear with the double half-plate lens, use the diaphragm.

At present I use the following combination with great success:—I have a double French lens for the normal plate, composed of two glasses of 8 centimeters in diameter, which answers for large portraits, and a single lens for monuments.

By adding to the first, the single lens, the convex side of the glass towards the interior of the camera, I obtain an image one quarter or third the size of the plate, excessively luminous, and a very short

focus that gives an extraordinary rapidity.

For this I have a tube 12 centimeters long, which slides upon the double lens, and at the extremity of which is a screw for adapting the single lens. I choose the distance according to the dimension of the picture I wish to obtain.

I thus obtain a portrait in ten seconds in shade, and one or two seconds in the sun.

With these two lenses you have all that is necessary for operating in every wished for condition, provided, however, that you do not desire that the dimension of the picture should exceed that obtained by the single plate.

OBSERVATIONS UPON THE EXECUTION OF PORTRAITS, AND THE REPRODUCTION OF DAGUERREOTYPES AND OIL PAINTINGS.

§ 30.—Tasteful effect is one of the most indispensable conditions for an agreeable portrait, and we should neglect nothing to obtain it.

The model ought always to be placed in shade, and one side a little more illuminated than the other. It is great want of elegance to place the head in the same position as the shoulders. If the face is full the body should be placed three quarters round, and *vice versa*.

The light obtained from a very large window is good for the execution of portraits, but care should be taken to place before the window a white screen, to project reflected light upon those parts that are in the shade. Without this precaution we obtain a too sudden transition from light to dark, which is not harmonious.

A mirror so placed as to convey the reflected rays upon that part of the figure in shade, gives also a very beautiful effect.

The model should be placed between the direct rays from the window, and those reflected by the mirror.

The exterior diffusion of light is very good, assists the rapidity of action; but, in this case, it is presented to one side of the model only, leaving the other in very deep shade, and without the assistance of reflected light the effect would be entirely destroyed.

I have met with much success in copying daguerreotype impressions upon paper. For this purpose, I adapt my single lens

to a camera, from fifty centimeters to one meter of focal length. I then cover the whole front of the camera and lens with black cloth, leaving only an opening the size of the diaphragm. By this means, I obtain a remarkable intensity in the blacks of the proof, and avoid the reflection of the camera in the plate.

The light should fall upon the plate by oblique rays, and in such a manner that they can never reflect at a right angle into the camera.

The image may thus be obtained equal to, or double and treble the size of the plate to be copied.

The same precautions should be taken in oil paintings.

A much longer exposure in the camera is required to copy a plate the same size or larger—from a quarter to half an hour, according to the size. When a portrait is taken in a sitting posture, the knees and hands are generally too forward to be in focus with the face. To overcome this difficulty, I have the slate that holds the plate at the back of the camera curved. To obtain this curve I place the person in a chair, the hands and knees in the most habitual position, and then calculate, upon the ground glass, the difference in length of focus between the hands and face. This difference being determined, I make the curve of the plate to correspond with the place of the image.

The place occupied by the head should be scrupulously the same as upon the ground glass, and the curve arranged only for the part out of focus. I have found the proof come out perfectly at all points by adopting this method.

I also place a dark drapery before my model where the eyes may rest, as it is less fatiguing to the sight than light colors. I place upon the parts of this drapery where the eyes are to rest, a wafer. The eyes should not be too intently fixed upon the wafer, but with a degree of freedom; otherwise, they will become suffused with tears, and by the effect of nervous contraction the portrait will become distorted.

I have endeavored to give, in this practical part of my treatise, all the instruction I considered would be useful to the amateur for the success of his pursuits. Discouragement should not follow from the want of success at first. By observing ex-

actly all the directions given, difficulties will be surmounted and success certain.

Every day I am practically engaged in this art at my Photographic Rooms, No. 7, Chemin de Ronde de la Barrier Cliche, and shall esteem it a pleasure to give any further information and assistance which may be needed, and exhibit my extensive collection of specimens made by these processes as many of which have been executed by myself as by my pupils.

APPENDIX TO PART FIRST.

§ 31. I here give the different processes heretofore published by myself. I earnestly request those who may follow my method not to apply themselves to the experiments described in this appendix and in Part 2nd, until they become perfect masters of Part 1st; otherwise their progress to the period of complete success will be retarded.

These processes, as well as those described in Part 1st, are entirely my own, and I claim the invention. In a preceding pamphlet, I spoke of ammonia and fluoride of potassium.

Several years ago I occupied myself with the study of the fluorides, and in 1847, I spoke of these bodies to M. Martens, who then made experiments upon glass for M. Niepce, describing to him how its sensibility and affinity for silica might be advantageously employed for the operations on glass. Finally, my pamphlet, which appeared the first of June 1850, gives me a date very conclusive of priority over M. Blanquart Evrard.

Preparation of negative paper with Gelatine.

§ 32.—Dissolve in a litre of hot distilled water, 25 grammes of isinglass of commerce.

Take of this sizing still hot	365 grammes.
Add: Iodide of potassium	13 “
Bromide do.	4 “
Chloride of Sodium	2 “

Let the mixture dissolve well, and then filter through a fine linen cloth. Put this solution, yet hot, into a large dish into which plunge your paper completely, sheet by sheet one upon the other, taking good care to disperse the air bubbles that might be formed. Leave the paper a quarter of an hour in this bath; then hang it up to

dry, and continue the operation as described at § 10.

§ 33.—The bromide does not possess here the same accelerative character as for the silvered plate; on the contrary, instead of accelerating, it somewhat retards the luminous operation. Its action is to preserve upon the gallic acid the whites of the paper which would darken more rapidly if we employed the iodide only. It also admits of a longer time for development, and a very powerful proof is thus acquired. The chloride of sodium gives more intensity and rapidity to the proof.

The liquid that remains is received in a bottle which is closely stoppered, and by filtering and cooling anew in a glass or earthen vessel, it can be used for fresh preparations until exhausted.

This process gives proofs of very great delicacy and of excessive harmony. We ought to employ it principally when we are obliged to reproduce objects in which the contrasts between the whites and blacks are very strong. We obtain thus, by its use a more exact relation of tones between the lights and shades which would be very difficult with a paper giving very powerful shades, as that prepared with sugar of milk and wax.

Alcoholic preparations of Negative paper.

I obtain moreover a very good negative paper with the following alcoholic solutions.

First formula.

§ 34.—Pure Alcohol at 36°	1,000 gr.
Collodion	10 "
Iodide of Potassium	10 "
Cyanide do.	1 "

Second formula.

§ 35.—Alcohol at 36°	1,000 gr.
Camphor	15 "
Varnish of Lac with Alcohol	5 "
Iodide of Potassium	8 "
Cyanide do.	2 "
Fluoride do.	2 "

The advantage which these preparations offer is that of permitting us to soak a great quantity of sheets at once, the alcohol penetrating them with the greatest facility.

§ 36.—When you have chosen one of these formulas, pulverize the salts and resins, and then put them with the alcohol into the bottles leaving them a day or two before using. Be careful during this in-

terval to shake the bottle occasionally, to facilitate the solution. At the expiration of this time, if some matter remains without being dissolved, it need give you no uneasiness, but pour the liquid into a basin, filtering it through brown paper to clear it. Then soak all the paper in the basin, which we cover over with a glass to avoid the evaporation of the alcohol, and then to make the alcohol penetrate everywhere between the sheets.

After an imbibition of a quarter of an hour, withdraw them *en masse*, drop them at once into the basin, and then pierce them at the same time with a silver needle in order to string them upon a packthread which you attach to two walls—from one side of the room to the other.

Separate each sheet by sliding them along the packthread, and you will find that you can prepare and dry a large number of sheets in a small space and in a little time. This paper may be preserved extremely good a long time.

For the continuation of the operation, see § 10.

PREPARATION OF NEGATIVE AND POSITIVE PAPER BY THE AMMONIO-CITRATE OF IRON.

§ 37.—I join to these processes a method given in 1843 by Sir John Herschel, with some additions which I have made. This is the most simple process which exists for preparing sensitive paper. It is rather slow to be employed for the camera, but it gives good results in making the positives.

Soak one side of the sheet of paper, to be prepared, in a solution of moderately concentrated ammonio-citrate of iron (§ 76), and then let it dry in the dark. The sheet thus prepared ought to have a golden yellow tinge and not pass to the brown. In this state it is sensitive to light, and you can use it dry, either with the camera, or for copying a negative into a positive by reproducing in a frame. In the first case, nearly half an hour of exposure is necessary, and in the second, from ten to twenty minutes. The image is then scarcely visible; but it is developed very rapidly under the influence of a neutral solution of chloride of gold or nitrate of silver. It acquires then the most beautiful black tints and a degree of perfection which

few proofs can surpass. Stop the action of the metallic bath by plunging the proof into the water, which you must change two or three times. Dry it likewise and preserve it in a port-folio. To fix this proof completely you must wash it in a solution of hydriodate of potash and wash it anew with water; being dry, it is finished.

I have lately added, with success to the process of M. Herschel a very feeble quantity of nitrate of silver in the solution of ammonio-citrate of iron. The image is thus obtained quite rapidly with the camera, and this paper gives very beautiful results as to the positive. I vary the tones by bringing the proof out, either with the solutions of gold, of silver or even of gallic acid.

The formula which I employ is this:

Water saturated with ammonio-citrate of iron	100 gr.
Distilled water	100 "
Nitrate of Silver	2 "

PART II.

THE CAMERA AND OBJECT-GLASS.

§ 38. The camera-obscura is the principal instrument of the photographer. It is that which directs the action of light for making a chemical agent—the *photographic image*—effecting the decomposition of the sensitive coating which receives the radiation.

The camera-obscura was invented in the sixteenth century by Baptista Porta. It was then simply a wooden box blackened inside and furnished with a single bi-convex lens, adapted to a tube with a groove serving to place the image at the focus. This image was received upon a white paper screen, then, more lately, upon a ground glass; it was fringed at the edges by the colors of the solar spectrum. This instrument was designed by Porta for copying exactly the most difficult views by tracing the outlines upon the screen with the aid of a pencil. The image thus obtained was reversed. To remedy this inconvenience, and render the use of the instrument easier for designing, the images were afterwards corrected by receiving them upon a plane mirror at an inclination of 45° . The image was then reflected and received above the box upon a ground glass, in such a man-

ner that it was found in a right position, and not upside down as before. It was with this imperfect instrument that *Canalotto* made, in 1697, the views of his admirable pictures of Venice. Already, in its infancy, this discovery had an influence upon the art. What may we not expect now with the perfect instrument and admirable pictures we now possess for reproducing the optical image, thanks to the discoveries of M. M. Niepce and Daguerre!

Subsequently, the periscopic lens was substituted for the bi-convex—concave towards the objects and convex towards the image. Clearness was thus gained; but this clearness did not become really perfect until in place of the single lenses composed of a certain material giving to the objects a fringed appearance composing the seven colors of the solar spectrum and at the same time, as many distinct foci, he substituted the achromatic lenses, formed of a crown glass convex in shape, turned to the interior of the camera, and a bi-concave or plane concave of flint glass placed towards the object. By this arrangement he succeeded in concentrating all the rays possible at the same focus. At the same time that M. Daguerre made this last improvement with the lens which bears the name of object-glass, he determined in a very learned manner the relative size of the camera and its arrangement, which is that generally adopted at the present time. The interior was scrupulously darkened in order to stop the reflection of the luminous rays which did not arrive directly from the lens upon the field destined for the image. M. Blanquart Evrard wished to overthrow all established theories by proposing the use of a camera whitened at the interior, and this, for obtaining more rapidity. This method was very defective. It was not sufficient for quickening the operation or improving it. The rays falling upon the white walls of the camera and representing only a part of the image, is found to be reflected at the same angle with that of incidence, arriving exactly upon the good part of the image, where they are superimposed in a manner scarcely apparent, it is true, but however slight it may be, they are, nevertheless, superimposed. That which passes upon one of the walls passes upon the other. It follows, therefore, that a multitude of reflected rays cross each

other in all parts of the image, and it is impossible to make a truly clear image under these circumstances.

The camera-obscura is still, at this time, the only instrument employed by the true lovers of beautiful pictures.

The achromatic lens described by M. Daguerre is very perfect, and we have not constructed as yet an object-glass much more perfect and better calculated for reproducing landscape. If we wish to avoid the aberration of straight lines, it is necessary to make use of object-glasses with long foci. We should never employ an instrument having less than from forty to fifty centimetres of focus, to reproduce an image of the size of the normal plate.

§ 39. The lens of M. Daguerre is periscopic and has the convex part turned inside of the camera. It is furnished with a tube nearly eight centimetres in length, which bears at its extremity movable discs, pierced with round holes of a greater or less diameter. These discs are called *diaphragms*, and serve to diminish the aberration of sphericity by arresting the extreme rays and giving—the large—more light, but an image more vague—the small, an extreme clearness but less light. We may employ the diaphragms from five centimetres in diameter of opening to a centimetre only. It is by varying the size of the openings, according to the light and the nature of objects which we are to copy, that we succeed in giving proofs the proper character and appropriate to the subject reproduced.

The disc not pierced, which serves to shut the object-glass bears the name of *oblurator*.

§ 40. Several years ago, object-glasses were constructed with two achromatic lenses, combined, which furnished a more luminous image by admitting of a larger opening. These object-glasses are especially excellent for the portrait. The Germans and M. Charles Chevalier claim the invention.

The complete theory of lenses would occupy too much space to be comprised in the body of this work. Bi-convex lenses concentrate light to a focus and are called for this reason, convergent lenses. The point of meeting, nearest the lens, of the

luminous rays is called the *principal focus*. Bi-concave lenses, on the contrary, disperse the light, and have received the name of divergent lenses. These lenses have not, therefore, any real focus. We have given the name of *virtual focus* to the point which is established by the section upon the axis of the rays prolonged in a contrary sense to their direction. Lenses have an optical centre which is a particular point, so that every ray passes out in a parallel direction to that which it had before its entrance into the lens; insomuch, that on account of the smallness of the lens, the deviation is imperceptible.

The optical centre of a bi-convex or bi-concave lens, formed of two equal curves, is found in the middle of the lens; in a plane convex or concave lens, at the top of the curved part; finally in a concave-convex lens it is beyond the lens.

To trace the course of the light in a lens, it is necessary to bring to each point of incidence a perpendicular line, upon a tangent; if the passage is made from a rarer to a denser medium, the light approaches the perpendicular. It deviates from the perpendicular in the contrary instance. It is by adapting the curves in relation to the dispersive and refractive powers of the materials employed, and by a suitable choice of foci, that we arrive at achromatism in object-glasses and avoid the chemical focus, or rather make the two coincide.

§ 41. By chemical focus, we mean a focus which is not so apparent when the image is discovered the clearest upon the ground glass, but one which is latent, and which we determine the more readily by making a proof of round objects at different distances.

After placing it exactly at the point of the visual focus, you draw a proof which must be developed without disturbing the camera. Then mark upon the tube at the groove of the object-glass the length of the focus; then the difference discovered in the distance of this mark for restoring to the focus the object which has become clear in the proof, is the length of the chemical focus which it is necessary to obtain in placing it at the point.

TO BE CONTINUED.

MR. HILL AND HIS MANIFESTO.



WING to the delay in publishing the October number to which we have been subjected, we are enabled to lay before our readers the following manifesto of Mr. Hill. To say the least of it, we consider it not only very injudicious at this time, but most unjust to the great body of daguerreotypists in this country.

Nearly two years ago, Mr. Hill made his announcement of the discovery. At that time the business of daguerreotyping was very active, and all were doing well. But a short time after the announcement it fell off one half or more, and none will deny that this was owing almost entirely to published accounts of Mr. Hill's invention. For several months daguerreotypists complained of its effects, and Mr. Hill himself acknowledged the cause attributed by daguerreotypists, even his friends. Within the last three months the minds of the people had become settled in regard to this discovery and daguerreotyping has improved rapidly, daguerreans have worn smiling faces and have looked towards the future with bright hopes; but no sooner is this the case, than Mr. Hill knocks the props upon which they have been leaning, by this one blow of selfish ambition. If it had been judiciously given to the daguerrean artists through a medium beyond the reach of the public and intended to reach the eye of the daguerrean only, then he might have been entitled to some consideration for the act; but no, he must blazen it forth to the public through one of the most popular journals of the day, and by this means throw the minds of the people into a blaze of feverish excitement and expectation, and, consequently, again prostrate the daguerrean business, probably for months to come, for in the whole article there is not one word of promise; on the contrary, the same old excuse for not bringing it to a speedy termination. We do not deny that Mr. Hill has suffered by illness, on the contrary, we know he has, and that severely, and for this he has our

deep sympathy, but for this very reason, if there were no other, he should have kept silence at this time.

Again; for ourselves, we never doubted that Mr. Hill had obtained daguerreotypes in color, but, as we have said before, we are fearful that his state of health and the difficulties in his way, will not permit him to perfect it. We do not in these certificates see anything to change our mind. They merely assure us that such things as colored daguerreotypes have been seen in the possession of Mr. Hill, but they give us no assurance that the process for taking them will ever be made practicable by him. In fact, the letter of Mr. Morse is rather equivocal on this point.

Under these circumstances, we must give the opinion, that Mr. Hill has been very culpable in his present course. At the same time that he expresses his fears that his discovery has and will injure the business of his bretheren in the art he gives it a stab from which it will not recover for months.

To put forth such a manifesto to the public before he was fully prepared to present his process to the world immediately thereafter was not only unjust to the daguerrean artists, but highly culpable. If he is prepared to teach his process we will say to him as the Dutchman said to a neighbor whom he called a thief.

"If you did not stheal mine chickens, I sall take the vord pack." He had seen the feathers in his neighbor's basket.

Until this time, Mr. Hill has done nothing to demand our censure so much as this. His card is addressed to daguerreotypists, but it appears to us a whining attempt to gain the sympathy of the public at their expense. He may eventually perfect his discovery; but there is a probability that he will not—his own defense and Mr. Morse's letter is suggestive of this—and under such circumstances such a paper should not have been put into the hands of the public. If he desired to communicate with the daguerreans of this country and Europe the columns of our Journal, and that of Humphrey's, were ever

open to him, and through them or by means of a private pamphlet they could have received the desired information without any danger to their business. As it is, it must suffer.

We have omitted some of the certificates published in the N. Y. Times, because they have been published before, and under any circumstance would be of little value.

TO THE DAGUERREOTYPISTS OF THE UNITED STATES AND THE PUBLIC AT LARGE.

A STATEMENT RESPECTING THE NATURAL COLORS.

BY L. L. HILL.

To the Editor of the New York Daily Times.

During about one year past, a large portion of the public, I presume, have regarded my discovery as a "delusion," a "humbug," or some such thing. This has been owing to a train of circumstances which I will not dwell upon in this communication. The public are more interested in the main question relating to the claim involved; other points in which the most glaring injustice has been done me, will receive due attention ere long.

The period of time referred to, I have occupied in hard study and severe labor upon my process. I have made *very important advances* toward conquering the difficulties attending the manipulations; and if my health (which threatens to fail,) hold out, I hope, ere long, to announce my readiness to impart the secret to others.

In the meantime, attempts are being made to supersede me, both in this country and in Europe; and it would appear that there are those among my countrymen, who would betray the honors that grow on our mountains, and deliver them into the hands of *La Belle France*. Hitherto, fear of injuring the daguerreotyping business has prevented me from vindicating my name from the many foul, selfish and totally groundless aspersions which have been cast upon it. But I now feel that a precautionary step on my part is called for; and I this day offer a public and permanent record of the subjoined proof of my claim. The following certificates are taken from a mass of between forty and fifty similar ones in my possession, all of which would have been published had not these been deemed quite sufficient. The few persons, if any, who may be disposed to cavil at

such testimony as the following, I have neither time or disposition to parley with.

True, my success has been delayed, and my early hopes of an almost immediate *debut*, were blasted for a season, when I put the workability of the pleasing wonder to a test; but it is equally true that other important and finally successful inventions have been delayed much longer, and that mine is now on the right side of the rubicon. During my struggles with the invisible goblins of a new photogenic process, (daguerreotypists will understand this allusion,) I was entitled to the sympathy of the professed friends of art; and in many cases I have received it. My thanks will ever be ready for the many daguerreotypists and others, who have cheered me on. Moreover, I am well convinced that I would have enjoyed the friendly disposition of the entire body of Photographers, had it not been for the strenuous efforts of a *few persons* to "delude many professors of the art" as they libellously charged me with having done.

This invention is *my own in every sense*, and not *another's in any sense*; except as I am *morally bound* to do good with it. My natural and legal right to retain it in my own hands, to dispose of it to others, to give it away, or sell it in any manner, and at any time I see fit, I hold as unquestionable. The right of others to control it, or me—to "pull me out," "drive me out," or "scare me out,"—to denounce me if I do not act contrary to my own sense of duty—to scandalize me, for the sake of the "almighty dollar," or in any manner to intermeddle with, or pronounce upon *my business*—I utterly deny.

Those who do not like this view of the case, are at perfect liberty to invent the colors for themselves if they can.

I have discovered all I ever claimed—a *method of heliotyping the colors of objects truthfully, brilliantly, and imperishably*. In dressing this child of light for the public gaze, I claim the privilege of being left undisturbed, in these mountain wilds, to do it in my own way. At the same time I can assure the public that I am progressing admirably; the child is daily growing in stature and beauty; and I am laboring assiduously to gratify the curiosity of the world at the earliest possible day. I am also desirous of cultivating the friendship

of all in the daguerreotype ranks, in all reasonable ways, but I will not yield my rights; and I realize the responsibility of my position too deeply to jeopardize the perspective usefulness of my invention in any way.

I will offer a remark as to the *manner* in which I have exhibited my results. This has been as you will see mentioned in almost every certificate, in *broad daylight*, (generally under a *skylight* of 8x10 feet :) I have suffered them to be *handled freely, rubbed vehemently*, and, in some cases, to be viewed under a *powerful magnifier*, and in the *Stereoscope*. In fact, the more closely they are inspected, the more evident do the *fineness of their details* become.

Editors who may be pleased to give this document, or an abstract of it to their readers, will greatly oblige me by forwarding to my address copies of their papers. One object I have in publishing this paper is to retain for my native land, the honor of the discovery. It is well known that shortly after my announcement was made, M. Niepee, of France, made a similar announcement, and that, too, *because* of this same "publication abroad." It is well known that in all his statements, and those of his friends, no such results as mine, as respects brilliancy and durability are claimed. What I claim, therefore, for my country, is priority in a process for heliotyping nature, "truthfully, brilliantly, and imperishably," and it is for the maintenance of this claim that I ask the aid of the Press.

L. L. HILL.

Westkill, Greene Co., N. Y. Oct. 18, 1852.

TESTIMONIALS.

I have in press a pamphlet containing some thirty *certificates* in support of my claim, which I will furnish to the order of any daguerreotypist. In the meantime, feeling unwilling to trespass upon the columns so kindly granted me, I present the following abstract. All I ask is a fair hearing, and I have too much "confidence in mankind" to look for less.

The following extracts from a letter of P. C. WYETH, Esq., published in the *Cincinnati Daily Times*, of Aug. 25, will be read with interest, as showing the opinion of a portrait painter of high standing:

"You ask me why I do not return to Cincinnati. The time has not yet come. Suffice it to say for the present, that I have been out to see the Hillo-type, or photograph in natural colors, discovered by L. L. HILL, and that until it comes out, I shall not feel disposed to leave New York. I have seen several pictures taken by the camera.

"These pictures are enameled—cannot be rubbed out—can be seen from any point of view—are as easily taken as daguerreotypes—not any more expensive—have most of the charms of natural color—will prove a great auxiliary to art—and are a contribution of wondrous beauty to the science of the age. The colors are a discovery—the process of taking them an invention, destined by the science of our time to advance and popularize aesthetic study beyond all former precedent.

"This is an *American* contribution to science for the next World's Fair, to which European schools of art will be more indebted than they have been to Greece.

"Nor are its utilitarian aspects to be overlooked; for Mr. Hill is a public benefactor, deserving riches and immortality. He has furnished to the widow and the fatherless, and those that have no help, a truly feminine and reliable profession; and to the traveler, the man of science, the botanist, florist, &c., a most invaluable assistance."

WESTKILL, Greene Co.

New York, Dec. 12, 1851.

I know, from personal inspection, that his avowed discovery is "an unmitigated" reality—having repeatedly examined many of his pictures, heliographed in natural colors upon burnished silver plates chemically coated; and which present, in a beautiful and brilliant form, the various shades and tints of red, blue, violet, green, yellow, orange, and all the colors of the spectrum.

The specimens which I have examined consist not only of copies of colored prints, but flowers, views, and likenesses of persons whom I know, taken from life, and surpassing, in a degree far beyond expression, the finest miniature paintings I have ever seen.

I have no personal interest to subserve in making this avowal, but do so from the purest motives, and with a sincere desire to aid in vindicating the character of Mr.

Hill from the invidious attacks made upon it, by persons who seem to be ignorant of his high moral worth, as well as of the reality and transcendent character of his discovery.

A. E. CLARK,
Pastor of the Baptist Church, Westkill.

CATSKILL, Greene Co.
New York, Jan. 27, 1851.

TO THE PUBLIC.—This certifies that I have been privileged to be a witness to the discovery of L. L. Hill, and I take great pleasure in stating, in the most positive terms, that having seen a large number of his specimens, they are better by far than he has ever represented them, being far superior to the best daguerreotypes or painting. His views possess a charm which no pencil or brush can equal, and which Nature alone can excel. His portraits from life, in natural colors, are perfectly exquisite. The tints of the various complexions are beautifully natural, soft and harmonious—the rosy hue of the cheeks and lip, the color of the eyes, hair, and the various tints of red, blue, green, orange, violet, buff, &c., in the drapery, greatly surpass the utmost I have ever conceived from the published accounts. A chief beauty of these pictures are in the blue, green, fawn and other colored gowns; these presenting a sort of mellow illuminated appearance, which causes the portrait to set out with a surprising relief and life-like aspect. In a word, I cheerfully lend my name to the assertion that Mr. Hill's claim is true to the fullest extent.

GEORGE W. HALCOT,
Sheriff of Greene Co., N. Y.

PHILADELPHIA, Jan., 6, 1852.

I have seen Mr. L. L. HILL's finished pictures, PORTRAITS FROM LIFE, taken with the camera upon silver surfaces, or usual daguerreotype plates, and must say, in reference to their perfect exactness of transcription from their originals, and their exquisite, their transcendent beauty, as works of art, I cannot only endorse all he has said of them, but speak even more strongly if stronger language could be found.

I have also seen numerous specimens of Mr. HILL's "experiments;" produced by the action of light, such as copies of prints, flowers, &c., with a view of developing the various shades, or tints of colors, many of which were truly beautiful and interesting.

His portraits from life, I am happy to say, are all that the most enthusiastic daguerrean artist can desire, and much more beautiful than our scientific men and the public have been led to suppose. The time will come when all generous minds will award to Mr. HILL the credit for having guarded so faithfully, thus far, the wonderful discovery which it has been his good fortune to bring before the world.

M. A. ROOT, Daguerreotypist,
140 Chestnut-st., Phil.

NEW-YORK, June 12, 1852.

This is to certify that I have just visited Mr. L. L. HILL, at his residence, and that he gratified me with a sight of his pictures in natural colors. I say most cheerfully, and as an act of justice to Mr. HILL, that I am perfectly satisfied of the truth of his claim in the broadest and fullest sense. These pictures are really exquisite and beautiful, differing essentially from any other style of picture. They present every possible variety of color and tint, in a most brilliant form—the whites are peculiarly bright and glossy—and the aspect of the pictures is one of astonishing boldness and relief. The flesh tints of the pictures from life, the color of the hair, drapery, background, &c., are fine beyond description; and I unhesitatingly pronounce the invention, a wonderful one, and shall hail with joy the day when I shall be allowed to work it.

J. GURNEY,
No. 189 Broadway, N. Y.

I cheerfully concur in the foregoing, and would add stronger language, if stronger could be found, in support of the entire and most gratifying truth of Mr. HILL's discovery. From actual inspection of his results, among them portraits from life, I am amazed and delighted beyond my power to express.

C. C. HARRISON,
Camera Manufacturer, 85 Duane-st, N. Y.
NEW-YORK, July 5, 1852.

MR. HARRISON is one of the oldest and best daguerreotypists in the country, and as a practical optician, has gained a world wide fame in the manufacture of cameras.

BOSTON, August 30, 1852.

This is to certify that I have examined with astonishment, several daguerreotypes, in which were faithfully copied all the colors of nature, by L. L. HILL, among them

a portrait from life, and upwards of thirty different copies of colored engravings, and I am fully convinced that he has discovered a chemical process by which he can take daguerreotypes with all the natural colors. Many of those shown me, were copies of birds of paradise; the subjects being a capital test for his newly discovered art; in the copies are represented upon the silver plates, every shade and tint of color imaginable: the impression is more readily seen than in the common daguerreotype, and appears imbedded in the silver instead of being upon the surface, and the higher the plate is polished after the impression is taken, the more brilliant are the colors thrown out.

JOHN A. WAIPPLE, Daguerreotypist,
No. 96 Washington-st., Boston.

Sept. 6, 1852.

I have seen a large number of pictures in natural colors, taken by L. L. HILL, of Westkill, N. Y., and have no hesitation whatever, in pronouncing them truthful and genuine, and all, and even more than they have been represented. They are truly wonderful and astonishing productions of art: not "miserable transfers," as falsely asserted, but faithful pictures taken in all the brightest, and strongest colors of nature. The most minute tints and shades are distinctly visible on the metallic plates. I have had them in my hands, for the most rigid and close examination, and tried, in vain, for a long time, to efface them with a buff. They can be seen at a long distance distinctly, much plainer than a painting on canvas, and far more beautiful. I saw them in all stages of development. I have no hesitation in saying that the pictures shown to me would challenge the admiration and astonishment of the world.

B. ENGLAND,

Daguerreotypist, formerly England & Gunn, corner of Fifth and Chestnut-sts., Philadelphia.

From Professor Morse, Inventor of the Magnetic Telegraph.

POUGHKEEPSIE, N. Y., Oct. 6, 1852

Rev. L. L. HILL—My Dear Sir:—It gives me great pleasure to testify, from ocular demonstration, to the reality of your discovery of a process for fixing the colors

of the camera-obscura image. The results you showed me, especially one of a bird of varied plumage, taken in two seconds, showed conclusively that the blues, yellows and reds, were distinctly given and fixed. That there should be imperfections in the manipulation of a new process, and that you should therefore desire to be so familiar with it as to bring it before the public in a perfect form, are circumstances natural and to be expected. But the reality of your discovery is beyond question; you have laid the foundation on which will be built a splendid structure. Every stone, and the finish of each, or of the whole building, it may not be in your power from your feeble health, to give; but whoever builds must build on your foundation. The astonishing tenacity of the colors upon your plates, yielding neither to rubbing nor ordinary exposure, is a distinct feature of the greatest importance. So also is the quickness of the process, which, when more exactness of manipulation is attained will enable you to fix at will the more fleeting hues of nature, particularly in the atmospheric tints, and the expressive colors of the complexion of a portrait. The beauty of the flesh-tints in the two Female Heads from Nature, which you showed me, and those also in the full length of your little daughter, fully verified this.

M. BECQUEREL, one of the most indefatigable and illustrious savans of Europe has had his great mind, with all its garnishment of scientific facts, directed to the solution of the problem of fixing the colors of the camera image, and the result, if report is true, is failure: "he was never able to fasten the colors." M. ST VICTOR has also obtained results ingenious and beautiful, but I learn that they are equally evanescent. But even if they were permanent, the length of time required to fix the image, is fatal for all the varied practical purposes to which yours is applicable. Portraits cannot be taken by a process requiring "two hours," or even fifteen minutes. Your discovery, so far as I am yet apprised of the labors of scientific men is unique, and as yet the only one which promises in its perfected state, the great ends desired.

With respect, your friend and servant.

SAMUEL F. B. MORSE.

GOSSIP.



CONSIDERABLE of a revolution is now taking place in the daguerrean art—particularly among the New York artists—caused by the introduction of the stereoscope. Like almost every improvement, this had to run the gauntlet of fears and speculations, distrust and hyper-criticisms, blind opposition and ignorant prejudices, and we were very nearly despairing of ever seeing it adopted.

We are indebted to Mr. O. Peters for its introduction to the New York public, and it was not until he had demonstrated its practical application to the daguerreotype, and its wonderful and beautiful effects that others mustered sufficient courage to adopt it; in fact it is within three or four weeks that Messrs. Brady, Gurney and Beckers & Piard have followed him. As we anticipated, it has given a new impulse to the business, and much enquiry has been elicited from daguerreans, as to the most practicable method of taking Stereoscopic pictures. It is unnecessary for us, at this time, to trace the history of the stereoscope as we have in former numbers given as full an account of its discovery by Professor Wheatstone, its use and peculiarities, as can possibly be written. We shall therefore confine ourselves to a brief description of the methods of taking daguerreotypes for them.

The best and most economical is to use two cameras, having precisely the same focal distance, placed side by side, and at equal distance from the sitter. It is necessary that a slight difference of position in the model should exist upon the daguer-

reotype plate in order that a perfect roundness may result from the action of the stereoscope, and this difference is obtained by the variation of perspective caused by the slight divergence of the line of vision through the lenses from the sitters; in other words, the rays of light proceeding from the object to be copied diverge towards each camera, and form the images upon the spectrums precisely alike except in the perspective one being foreshortened. An idea of this slight difference in perspective is given on page 176, VOL. III, of this Journal. The plates are prepared precisely in the same way that they are for ordinary daguerreotypes and may be enclosed in a case in the same manner, substituting a double opening mat for the single. The most elegant form of the stereoscope is figured on page 175, VOL. III, of this Journal, but a more compact instrument, in the form of a case is made and sold by dealers in daguerreotype materials, which reduces the price to a mere nominal sum. These, however, are subjected to several objections, the principal of which is in the construction of the glasses, the simple convex lens being used, instead of the stereoscopic or meniscus, which from their very nature must detract from the beauty and solidity of effect given by the latter. With the majority they will, however, become the most popular as very little consideration is given to beauty and perfection where the pockets are concerned, even where the difference of fifty cents only occurs. What a comment upon the tastes of the people is the dialogue which often occurs between buyer and seller somewhat after this style.

“What is the price of a daguerreotype in this style?”

“One dollar and fifty cents, sir,”—a ninth or medium as the case may be.

“And what for one in this?”

"Fifty cents."

"Oh! well, take one of me for fifty cents; its good enough." And sometimes the addition is made; "its only for a friend."

But to return to our subject. Stereoscopic daguerreotypes may be taken with a single camera, by having two stands, and changing the camera from one to the other; or the sitter may be placed upon a revolving platform and the difference in perspective obtained by slightly changing the position of the sitter. But these two methods are subject to serious objections and great inconvenience. In order to practice either, the operator must have a most accurate eye for distance, both mathematically and artistically, as well as a perfect knowledge of the rules of drawing. Otherwise he will be apt to produce variations that will entirely destroy the effect intended to be produced. Mr. W. A. Allen is constructing a stand, an engraving and description of which we shall give in a future number, admirably calculated to obviate the difficulty now experienced by using two. These stands are intended to accompany Mr. C. C. Harrison's Stereoscopic cameras, which are undoubtedly the best made for the purpose.

The Stereoscope has been ranked by scientific men as one of the most wonderful of modern discoveries, and its effects are indeed most wonderful. "With the aid of this instrument we have the means of transmitting to posterity the exact image of all that is physically remarkable in the present day, at least so much as can be appreciated by the sense of vision." A new era has dawned upon the art of Daguerre which can only be surpassed by a successful termination to the Hillotype. The two combined will then be the very acme of daguerrean perfection. Then shall we have before us life-like images of our relatives and friends as perfect in all, ex-

cept the power to move and talk, as the original.

— THE NEW YORK STATE DAGUERREAN ASSOCIATION met pursuant to adjournment at Mr. Brady's Gallery in the city of New York on the evening of the second Wednesday of this month, but the attendance was so small that nothing more was done than the reception of the following valedictory address by the President.

GENTLEMEN OF THE NEW YORK STATE DAGUERREAN ASSOCIATION:—I may be permitted to congratulate you on the circumstances and period of our present meeting.

But little more than a year has elapsed since our first organization, and yet we perceive that encouraging progress has been made in the objects we have undertaken to promote.

It ought not to be considered a small circumstance that we have fairly made a *beginning*. Beginnings are usually difficult, and, in our case, a beginning seemed to be surrounded with peculiar difficulties.

So rapidly had our profession sprung into existence, so divergent were the habits and associations of its members, and especially so prevalent were unworthy and groundless fears and jealousies, that at first thought it seemed almost impossible to unite in any general and effective association.

Already some artists, many of whom are deservedly distinguished for their skill and their philanthropy have become practically enlisted in its objects, and we may safely presume that numerous others are prepared to enrol themselves on our list.

We already see a higher and nobler purpose cherished among many who perhaps adopted the profession merely as a means of livelihood. We have two able Journals, "The Photographic Art-Journal," and Hrmphrey's Journal, enthusiastically devoted to the promotion of our art, and one gentleman, E. Anthony, Esq., has proposed a munificent premium for degrees of success yet to be attained.

Let us now, gentlemen, place before us these general objects of co-operation and effort:—

First, the advancement of the Photographic Art by a laudable and by a tireless devotion to improvement.

Second, the creation of an *esprit du corps* among ourselves, and

Third, an elevation of the daguerrean profession into the *rank* of *Arts*.

The satisfactory accomplishment of objects so great as these will not be the work of a day, and we must, therefore, enter upon our enterprise with a determination to persevere even in the face of difficulties.

That our profession should be elevated and honored as one of the Arts and no longer regarded as a species of slight of hand, might be easily demonstrated.

Neither sculpture nor painting requires so much of science, whatever may be said of genius. And while other arts are scarcely now any more advanced than they were scores, perhaps hundreds of years ago, ours is advancing with every new discovery and keeping pace with the most rapid march of human knowledge and power.

The chief thing now, that is wanted among us as a profession is that enlightened self-respect that will secure the respect and honor of the community.

I need hardly say that this can never be attained while any considerable portion of us yield to low principles of selfishness and seek to advance personal interests by a sacrifice of morality, as, for example, by Sabbath profanation.

If we would be respected among men we must take a high and honorable position; a position that will bear the sunlight and will not shrink from virtuous observation.

Circumstances, gentlemen, do not permit detail in my remarks; I will, therefore, in conclusion, say, that the motives which should urge us to high and honorable motives in behalf of our profession are numerous and mighty.

I trust that we have all suitable aspirations for our own fame.

We must also remember, that with ours, will be associated the names of our friends and families after us; but independent of ourselves and of our interests, we should aim to become public benefactors.

Was not the discovery of photography hailed throughout the world as a wonder and a triumph before unsurpassed by human skill?

The wonder is now passed away, but hundreds of thousands of our fellow-beings are now actually possessing the cherished and tangible fruits of that discovery.

As art and time shall advance, millions more are yet to participate in the sweet and refined pleasures of an art which copies nature as no other art can do.

Indeed, so far from being content merely to place photography in the honorable rank of arts, we should aim to make it first and foremost among them. Nothing short of this is the proper destiny of the daguerrean profession.

While painting and sculpture are only to be seen in galleries, museums, and places of public rendezvous, our productions find their way to the million firesides of the nation and are made to rejoice under the smiles of genial hope and of pure affection.

While these reflections are pleasing, we may also aim at public results and at galleries also, which for variety and beauty, shall rival all those of the chisel and the pencil.

Let us then make "onward and upward" our motto, and ever seek for progress under the blessing of Him whose power made the light and whose favor giveth life.

A. MORAND.

The Association then adjourned until December, to meet at Utica, when the officers will be elected for the ensuing year.

We regret exceedingly that we have to record the fact that so few were in attendance at this meeting, as to prevent acts of importance from being past; but we have no doubt as to the cause. The daguerreotype business has been unusually active throughout the country this fall, and as a large majority of the artists have no assistants in their galleries whom they could leave in charge, they have undoubtedly found it impossible to remain so long away as it would necessarily require to come to New York. We trust, however, that the meeting at Utica in December will redeem the character of the Association.

While on this subject, we will subjoin

the following letter, as it breathes the right spirit and is in perfect accordance with our views.

To the Editor of the Pho. Art-Journal:

Mr. H. H. SNELLING—Sir; I see by a notice in the last Journal that the N. Y. State Daguerrean Association is to convene in your city, Oct. 6th. I have watched the progress and reports of these meetings with much interest for two reasons; first, hoping that much good might result from associated effort, and that a friendly interchange of views and a fraternal reciprocity would help to do away with that selfishness, which has been too predominant among daguerreans; a selfishness as characteristic of the profession as of inventors of quack medicines and cure-all-receipts. Honorable exceptions there are, however, to these charges, which a generous charity demands us to allow, exceptions which I have happily witnessed, and for which I have felt grateful.

Secondly, I have been anxious to know whether female operators are to share its friendship and receive of its benefits. From the silence maintained on the subject, I have inferred that we were not cordially welcomed into the fraternity, that we were either not considered competent to perform the labor with honor to the profession or were stepping beyond our appropriate sphere and practising an innovation; I am not disposed to reiterate the claim to equality of the sexes so often made the theme of remark in these days of progression; but if the above be the case, I would simply ask if female talent and genius have not been sufficiently developed to warrant the idea that the intricacies of the art, and its perplexities may not be overcome by the quick perceptions and patient perseverance of the female mind. A quickness of apprehension and a ready judgment are necessary requisites, and does woman fail in these? Has she not a love for the beautiful equally as strong, also as good taste for artistic arrangement? What though she may not have threaded the analytical mazes of chemistry, can she not judge of cause and effect so far as her knowledge has extended. Does the host of daguerreans who are traversing the country understand the science perfectly; many of whom will curl the lip with contempt at the idea of a lady taking

daguerreotypes. Permit me to respectfully request you, if not inappropriate, to obtain an expression of the Association on this subject, by resolution or otherwise, that I and others who are practising, may know that we have the sympathy and good wishes of wise and competent minds. If it be a lucrative employment may we not share in its profits? if an honorable profession may we not try to win its laurels? If it be an art designed to elevate and inspire the mind with a love of the beautiful and an admiration of the great source of all wisdom and beauty, the fountains of light, who can more readily appreciate it, than the cultivated and refined sensibilities of woman? Yours. &c.

MARCELIA W. BARNES.

Our fair correspondent is right, and we will venture to answer for it, that she is as fully entitled to the benefits of the Association as any member of the profession. There is no clause in the Constitution or By-laws that debars any lady daguerrean from membership; on the contrary, we know that the liberal members—they are all so—of the Association desire the countenance and assistance of the female portion of our daguerreans. Our correspondent has only to observe the form for admission as laid down in the By-laws to become, we feel sure, a Member of the N. Y. State Daguerrean Association.

— It was our intention to present our readers this month with an engraving of the elegant silver pitcher and goblets which Mr. Anthony has offered as a prize for the best daguerreotype taken previous to the first of November, 1853. There appears still to be some misconception as to the nature of the offer and the disposition of the daguerreotypes after awarding the prize. The prize was offered for the best whole plate daguerreotype, taken by a *whole plate camera*. Pictures taken by a double whole size camera, no matter by whom or how excellent, will be excluded by the

judges, if sent in. All pictures if desired will be returned to the artist who took them.

Since Mr. Anthony first announced his determination to award this prize, he has most liberally concluded to add a second prize of a pair of beautiful Goblets—an engraving of which will be given with the pitcher—for the second best picture. In awarding the prizes the characters of the judges are sufficient guarantee against impartiality, but in order that there may not be the shadow of an excuse for such an accusation, the regulations for sending in the daguerreotypes are such that they will not know by whom they are taken until after their decision is given.

We are at liberty to announce the following gentlemen as competitors.

J. Gurney, of New York City, N. Y.
A. Hesler, of Galena, Ill.
W. A. Perry, of Mobile, Ala.
Whitney & Denny, of Rochester, N. Y.
P. M. Cary, of Savannah, Ga.
V. L. Richardson, of Zanesville, Ohio.
John A. Whipple, of Boston, Mass.
Harrison & Hill, of Brooklyn, N. Y.
Meade & Bro. of New York City, N. Y.
J. H. Fitz Gibbon, of St. Louis, Mo.
D. D. T. Davie, of Utica, N. Y.
G. N. Barnard, of Oswego, N. Y.

— CATHAN'S REFLECTORS.—These reflectors are the most convenient, and the cheapest article of the kind we have yet seen got up for daguerreotype purposes, and they are equal in merit so far as their working is concerned to any others. We shall speak further of them in our next.

— It will be perceived that we have given this month an unusual portion of the works of Mr. Hunt and Mr. Gray. We do this in order to close them with the year and commence a new series, equally interesting and important, with our fifth volume, as well as to give our subscribers

the benefit of their instructions at an earlier date than would be possible by continuing the plan we have heretofore pursued.

— We must again apologise for being behind hand with this month's number. Our publisher Mr. Smith has been getting in a new press, and the desire to use it for the Journal has induced him to delay the publication several days. Hereafter he is in hopes of being in advance rather than behind his day of publication.

— It is rumored that the daguerrean artists of New York city have had a meeting and appointed a committee to wait upon Mr. Hill, and make an offer for his discovery, in view of its being made free to all. We have not learned the success of the mission, but presume, by their silence, that they have failed to bring him to terms.

— As we have not had time to visit the fair of the American institute, we engaged a gentleman well calculated to judge of the daguerreotypes there exhibited, to inspect and give us his impressions in regard to them. He has sent us the following:—

DAGUERREOTYPES AT THE FAIR.

Mr. SNELLING—DEAR SIR,—Having paid several visits to the Fair at Castle Garden, I am induced to note down for the Photographic Art-Journal a few remarks concerning the various specimens on exhibition by the Daguerrean Artists.

There are not as many competitors for the prize this year as in former years, still the specimens exhibited evince much taste and skill, and plainly show that our art is constantly progressing.

The pictures by Mr. Root who received the highest premium last year, are not any improvement on those which were exhibited at that time; indeed many of them are the same, which should not necessarily be the case, for the Art is certainly capable

of great variety—we see the same beautiful conception of the old Arm Chair, which of itself is well worthy of credit—we should have been pleased to have seen also with this another, or more than one of this same class of pictures.

Mr. Gurney has some specimens which reflect great credit on his skill and are such as will command the meed of praise from all the brethren of the Art, especially those of the largest size or double whole plate portraits; and if we mistake not, he will bear the palm of superiority this year at the final decision.

The Brothers Meadé, have greatly improved their style of pictures during the past year, and have placed themselves in the front rank of the profession; not only by their skill displayed in their arrangement of position, &c., but in their exquisite finish attained in the preparation of the plate, which is by far the most important feature of a good daguerreotype.

They have also some new styles of shading, which they seem pleased to call “Rembrandt style.” They are, of themselves worthy of favorable notice; and, although their customers may not be inclined to purchase such pictures, still they are varieties of the art, and tend to show the versatility of a true daguerrean artist. There will be a close competition, as indeed their should be, between such artists as the Messrs. Meades and Mr. Gurney. Each show their own peculiar style, and those that may be pleased with one may not be so with the other—thereby awarding to both the merit of pleasing all.

In close proximity to Mr. Root's pictures, we observe some excellent specimens by Mr. Holmes of views taken at Greenwood. They are of themselves works of art, depicting the double art of sculpture and the art of Daguerre; appealing also to the finer emotions of the heart—which is indeed true of all art—and bringing to our view the last resting-place of our near and dear friends. How appropriate then for us to possess copies of monuments which are so well executed by Mr. Holmes.

Mr. Insley has also a frame containing some peculiar specimens of the art. They are mostly executed with light backgrounds having the shadings very heavy—and show much skill in manipulating to produce

such results. They are, consequently, pleasing specimens of the art.

Passing along the upper gallery we observe some well executed daguerreotypes of Messrs. Brinkerhoff & Co., who, although they have not long been engaged in the business, nevertheless evince much skill, and show themselves masters of the art by the exhibition of some on the double whole size plate. Their style, however, is quite different from others—and that is a peculiar feature of this art; that each artist can display his pictures, and there will be such a marked difference, that to the eye of one acquainted with the various styles they each may be designated at a glance.

We observe also some specimens of photography by Mr. Holt, which are, perhaps, equal to any before of this style, known as Talbotypes or paper pictures. Still they are not such as please the public taste.

The fact that all these pictures taken on paper, require so much retouching by the hand of the painter will never recommend them to those who value the faithfulness of a daguerreotype. These specimens of Mr. Holt are not any improvement on those exhibited by Messrs. Langenheim a few years ago, if indeed, they are so well executed, and we all know, that he was unable with all his facilities to enlist the energies of the daguerrean fraternity in the prosecution of that peculiar style of pictures. And such we fear will be the result of those who are striving to excel in this branch of the art.

There is a field sufficiently wide in the daguerreotype itself to enlist all our energies, and there are many untrodden paths yet where those who persevere may excel, for the highest excellence is not yet attained in many of the beautiful processes known to our art.

In connexion with this peculiar art we may mention the style known as “*daguerreotypes in oil*,” on exhibition by Mr. Butler. They are indeed very fair specimens of small cabinet portraits in oil. But as far as being daguerreotypes with all the faithfulness so peculiar to them they are no more to be compared to them, than a rushlight is to the noon-day sun, from which our beautiful productions emanate. Their whole beauty and truthfulness is destroyed by entirely covering the expres-

sion, as indeed the whole plate is painted over by the hands of the artist.

There are a few others who have specimens, and such as would recommend themselves only to those who may want a very cheap daguerreotype. Of these, we have no word of praise nor indeed of censure. Their style is also peculiar as well as their price—and, graduated according to it, they are not indeed worth much more. There are some other artists who should not withhold their specimens from the Fair who have in former years been foremost in the field, and we trust that such names as Brady and Lawrence and Beckers may figure more conspicuously in the Fair to be held next May at Reservoir Square.—Yours, &c. B.

Since the above was written we have learned that Mr. Gurney has taken the gold medal prize of the American Institute.

— We have been obliged to omit part of our Gossip this month, to give place to the card of Mr. Hill.

PREMIUM FOR THE BEST DAGUERREOTYPE.—One year since I offered a reward of *five hundred dollars* for the greatest improvement that should be made in the Photographic art during the year 1851. No applications of any importance were made for it, probably in consequence of the natural modesty of inventors. Inasmuch, however, as the money has been offered, I consider that it no longer belongs to myself but to the Art. Therefore, with the advice and consent of Professor Renwick, Morse and Draper, who were appointed the judges in the matter. I have decided to invest the above amount in a **MASSIVE SILVER PITCHER**, of appropriate design, to be awarded as a prize for **THE BEST FOUR DAGUERREOTYPES** that shall be offer-

ed for competition previous to November 1st, 1853.

No competitor will be allowed to exhibit more than one Daguerreotype of each size.

The Daguerreotypes offered for competition must be on what is called the full, two-third, half and quarter sizes.

After the decision of the judges the pictures will again become the property of the artists who made them, and be returned as may be directed.

A description of the method of operating in the production of the picture offered, must accompany each picture, mentioning the brand of plate and the makers of the various chemicals used, as far as the operator may be able to tell.

In order that there may be no complaint as to partiality, the pictures must be sent anonymously, accompanied by a sealed package containing the name of the artist and the method of operating. The pictures and sealed envelopes will be marked with corresponding numbers in the order of their reception, and the latter will only be opened after the decision of the judges.

As this prize is offered as a test of the skill of manipulators and not the excellence of the camera, no instrument larger than the regular full size must be used. Daguerreotypes taken by the mammoth camera will be excluded.

Artists of all countries are invited to send pictures for competition.

All letters of enquiry upon the subject will receive prompt attention, and it is earnestly hoped the competition will be as spirited as possible.

All who intend to compete for the prize should send in their names as early as possible, as lists of the competitors will from time to time be published.

The pictures must be forwarded to my address, free of expense.

E. ANTHONY.

THE PHOTOGRAPHIC ART-JOURNAL.

Vol. 4.

NOVEMBER, 1852.

No. 5.

PHOTOGRAPHY.*

BY ROBERT HUNT.

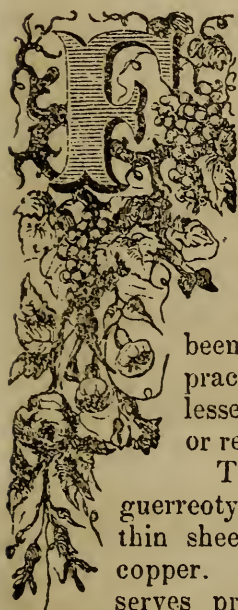
PROFESSOR OF MECHANICAL SCIENCE IN THE MUSEUM OF PRACTICAL GEOLOGY,

AUTHOR OF

"RESEARCHES ON LIGHT," "THE POETRY OF SCIENCE," ETC.

CHAPTER XII.

DAGUERRETYPE.—THE ORIGINAL PROCESS
OF DAGUERRE.



FROM the primary importance of this very beautiful branch of the photographic art, I shall devote a considerable space to a description of the original process, and add thereto some account of each improvement which has been published, having any practical advantage, either by lessening the labor required, or reducing the expense.

The pictures of the daguerreotype are executed upon thin sheets of silver plated on copper. Although the copper serves principally to support the silver foil, the combination of the two metals appears to tend to the perfection of the effect. It is essential that the silver be very pure. The thickness of the copper should be sufficient to maintain perfect flatness, and a smooth surface; so that the images may not be distorted by any warping or unevenness. Unnecessary thickness is to be avoided, on account of the weight.

The process is divided into five operations. The first consists in cleaning and polishing the plate, to fit it for receiving the sensitive coating on which light forms

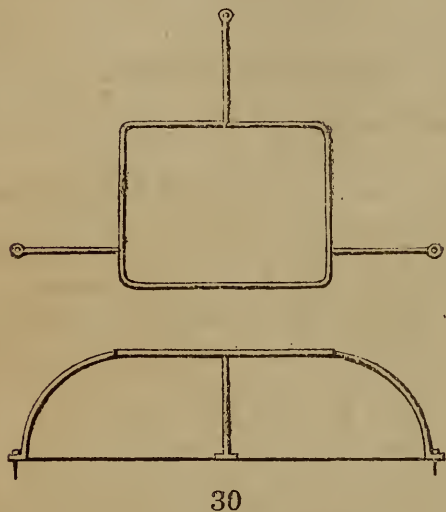
the picture. The second is the formation of the sensitive *ioduret of silver* over the face of the tablet. The third is the adjusting of the plate in the camera-obscura, for the purpose of receiving the impression. The fourth is the bringing out of the photographic picture, which is invisible when the plate is taken from the camera. The fifth and last operation is to remove the sensitive coating, and thus prevent that susceptibility of change under luminous influence, which would otherwise exist, and quickly destroy the picture.

FIRST OPERATION.—A small phial of olive oil—some finely carded cotton—a muslin bag of finely levigated rotten-stone—a phial of nitric acid, diluted in the proportion of one part of acid to sixteen parts of water, are required for this operation. The operator must also provide himself with a small spirit lamp, and an iron wire frame, upon which the plate is to be placed whilst being heated over the lamp. The following figures represent this frame. The first view is as seen from above. The second is a section and elevation, showing the manner in which it is fixed.

The plate being first powdered over with rotten-stone, by shaking the bag, a piece of cotton, dipped into the olive oil, is then carefully rubbed over it with a continuous circular motion, commencing from the centre. When the plate is well polished, it must be cleaned by powdering it all over with rotten-stone, and then rubbing it with dry cotton, always rounding and crossing the strokes, it being impossible to obtain a true surface by any other motion of the hand. The surface of the plate is now rubbed all

* Continued from page 222, Vol. 4, No. 4.

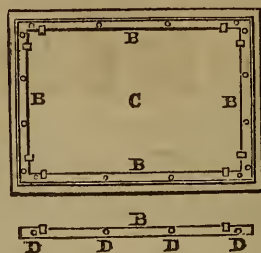
over with a pledget of cotton, slightly wetted with the diluted nitric acid. Frequently change the cotton, and keep rubbing briskly, that the acid may be equally diffused over the silver, as if it is permitted to run into drops, it stains the tablet. It will be seen when the acid has been properly diffused, from the appearance of a thin film equally spread over the surface. It is then to be cleaned off with a little rotten-stone and dry cotton.



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The plate is now placed on the wire frame—the silver upwards, and the spirit lamp held in the hand, and moved about below it so that the flame plays upon the copper. This is continued for five minutes, when a white coating is formed all over the surface of the silver; the lamp is then withdrawn. A charcoal fire may be used instead of the lamp. The plate is now cooled *suddenly*, by placing it on a mass of metal, or a stone floor. When perfectly cold, it is again polished with dry cotton and rotten-stone. It is necessary that acid be again applied two or three times, in the manner before directed, the dry rotten-stone being powdered over the plate each time, and polished off gently with dry cotton. Care must be taken not to breathe upon the plate, or touch it with the fingers, for the slightest stain upon the surface will be a defect in the drawing. It is indispensable that the last operation with the acid be performed immediately before it is intended for use. Let every particle of dust be removed, by cleaning all the edges and the back also with cotton. After the first polishing, the plate is fixed on a board by means of four fillets, *B B B B*, of plated cop-

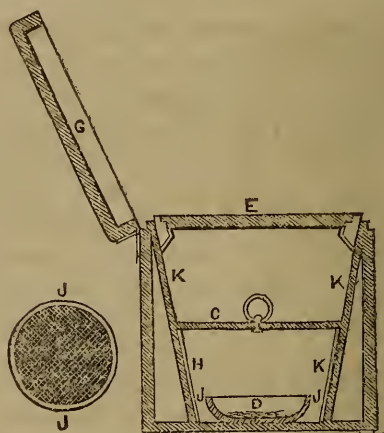
per. To each of these are soldered two small projecting pieces, which hold the ta-



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blet near the corners; and the whole is retained in a proper position by means of screws, as represented at *D D D D*.

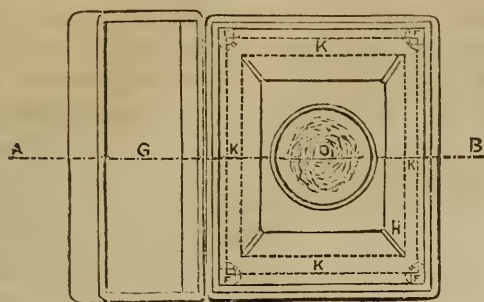
SECOND OPERATION.—It is necessary for this operation, which is really the most important of all, that a box, similar to figs. 32 and 34, be provided. Figure 32 re-



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presents a section, supposed to pass down the middle of the apparatus by the line *A B*, in fig. 33, which represents the box as seen from above. *c* is a small lid which accurately fits the interior, and divides the box into two chambers. It is kept constantly in its place when the box is not in use—the purpose of it being to concentrate the vapor of the iodine, that it may act more readily upon the plate when it is exposed to it. *d* is the little capsule in which the iodine is placed, which is covered with the ring, *j*, upon which is stretched a piece of fine gauze, by which the particles of iodine are prevented from rising and staining the plate, while the vapor, of course, passes freely through it. *e* is the board with the plate attached, which rests on the four small projecting pieces, *f*, fig. 33. *g* is the lid of the box, which is kept closed,

except when the plate is removed or inserted. H represents the supports for the



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cover C. K, tapering sides all round, forming a funnel-shaped box within.

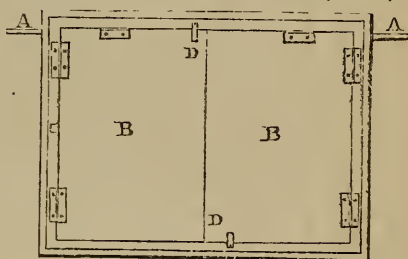
To prepare the plate:—The cover, C, being taken out, the cup, D, is charged with a sufficient quantity of iodine, broken into small pieces, and covered with the gauze, J. The board, E, is now, with the plate attached, placed, face downwards, in its proper position, and the box carefully closed.

In this position the plate remains until the vapor of the iodine has produced a definite golden yellow color, nothing more nor less.* If the operation is prolonged beyond the point at which this effect is produced, a violet color is assumed, which is much less sensitive to light; and if the yellow coating is too pale, the picture produced will prove very faint in all its parts. The time for this cannot be fixed, as it depends entirely on the temperature of the surrounding air. No artificial heat must be applied, unless in the case of elevating the temperature of an apartment in which the operation may be going on. It is also important that the temperature of the inside of the box should be the same as it is without, as otherwise a deposition of moisture is liable to take place over the surface of the plate. It is well to leave a portion of iodine always in the box: for, as it is slowly vaporized, it is absorbed by the wood, and when required it is given out over the more extended surface more equally, and with greater rapidity.

* If a piece of iodine is placed on a silver tablet, it will speedily be surrounded with the colored rings: two yellow rings will be remarked, one without and the other within the circle. The outside yellow ring alone is sensitive to light. This experiment will show the necessity of stopping the process of iodination as soon as the first yellow is formed over the surface of the silver.

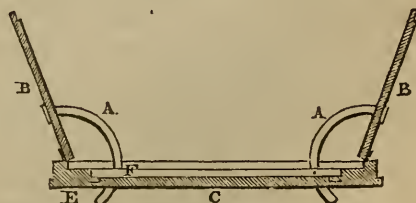
As, according to the season of the year, the time for producing the required effect may vary from five minutes to half an hour, or more, it is necessary, from time to time, to inspect the plate. This is also necessary, to see if the iodine is acting equally on every part of the silver, as it sometimes happens that the color is sooner produced on one side than on the other, and the plate, when such is the case, must be turned one quarter round. The plate must be inspected in a darkened room, to which a faint light is admitted in some indirect way, as by a door a little open. The board being lifted from the box with both hands, the operator turning the plate towards him rapidly, observes the color. If too pale it must be returned to the box; but if it has assumed the violet color it is useless, and the whole process must be again gone through.

From description, this operation may appear very difficult; but with a little practice the precise interval necessary to produce the best effect is pretty easily guessed at. When the proper yellow color is produced, the plate must be put into a frame, which fits the camera-obscura, and the doors are instantly closed upon it, to prevent the access of light. The figures represent this frame, fig. 34, with the doors, B B, closed



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on the plate; and fig. 35, with the doors opened by the half circles, A A. D D, are

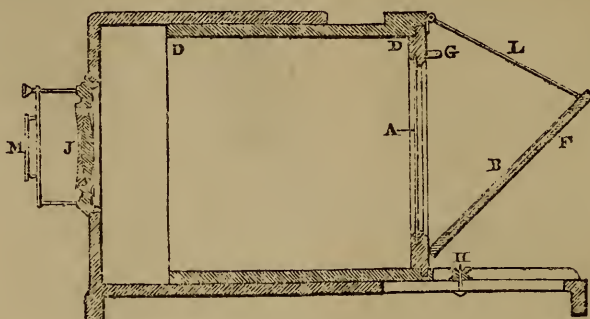


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stops by which the doors are fastened until the moment when the plate is required for use. The third operation should, if possible, immediately succeed the second: the longest interval between them should

not exceed an hour, as the iodine and silver lose their requisite photogenic properties.* It is necessary to observe, that the iodine ought never to be touched with the fingers, as we are very liable to injure the plate by touching it with the hands thus stained.

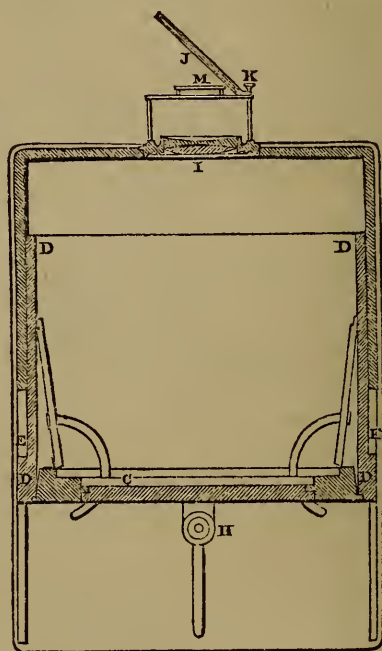
THIRD OPERATION.—The third operation is the fixing of the plate at the proper focal distance from the lens of the camera-obscura, and placing the camera itself in the right position for taking the view we desire. Fig. 36 is a perpendicular section,



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lengthwise, of Daguerre's camera. A is a ground glass by which the focus is adjusted; it is then removed, and the photographic plate substituted, as in c, fig. 37. B, is a mirror for observing the effects of objects, and selecting the best points of view. It is inclined at an angle of 45° , by means of the support, L. To adjust the focus, the mirror is lowered, and the piece of ground glass, A, used. The focus is easily adjusted by sliding the box, D, out or in, as represented in the plate. When the focus is adjusted, it is retained in its place by means of the screw, H. The object-glass, J, is achromatic and periscopic; its diameter is about one inch, and its focal distance rather more than fourteen inches. M is a stop, a short distance from the lens, the object of which is to cut off all those rays of light which do not come directly from the object to which the camera is directed. This instrument reverses the objects—that which is to the right in nature being to the left in the photograph. This can be remedied by using a mirror outside, as K J, in figure 37. This arrangement, however, reduces the quantity of light, and increases the time of the operation one-third. It will, of course, be adopted only when there is time to spare. After having placed the camera in front of the landscape, or any

object of which we desire the representation, our first attention must be to adjust the plate at such a distance from the lens,



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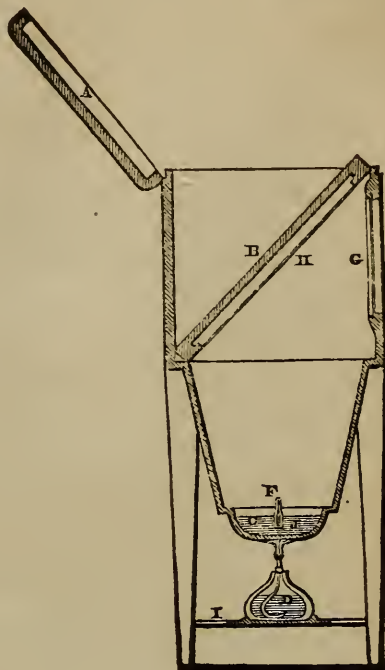
that a neat and shaply defined picture is produced. This is, of course, done by the obscured glass. The adjustment being satisfactorily made, the glass is removed, and its place supplied by the frame containing the prepared plate, and the whole secured by the screws. The doors are now opened by means of the half circles, and the plate exposed to receive the picture. The length of time necessary for the production of the best effect, varying with the quantity of light, is a matter which requires

* This is contrary to the experience of the author of this volume; and Dr. Draper, of New York, states that he has found the plates improve by keeping a few hours before they are used; and M. Claudet states, that even after a day or two the sensibility of the plates is not impaired.

the exercise of considerable judgment, particularly as no impression is visible upon the tablet when it is withdrawn from the camera. At Paris this varies from three to thirty minutes. The most favorable time is from seven to three o'clock. A drawing which, in the months of June and July, may be taken in three or four minutes, will require five or six in May or August, seven or eight in April and September, and so on, according to the season. Objects in shadow, even during the brightest weather, will require twenty minutes to be correctly delineated. From what has been stated, it will be evident that it is impossible to fix, with any precision, the exact length of time necessary to obtain photographic designs; but by practice we soon learn to calculate the required time with considerable correctness. The latitude is, of course, a fixed element in this calculation. In the sunny climes of Italy and southern France, these designs may be obtained much more promptly than in the uncertain clime of Great Britain. It is very important that the time necessary is not exceeded,—prolonged solarization has the effect of blackening the plate, and this destroys the clearness of the design. If the operator has failed in his first experiment, let him immediately commence with another plate; correcting the second trial by the first, he will seldom fail to produce a good photograph.

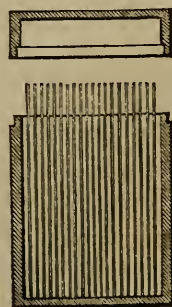
FOURTH OPERATION.—The apparatus required in this operation is represented by fig. 38. A, is the lid of the box; B, a black board with grooves to receive the plate; C, cup containing a little mercury, J, D, spirit lamp; F, thermometer; G, glass through which to inspect the operation; H, tablet as removed from the camera; I, stand for the spirit lamp. All the interior of this apparatus should be covered with hard black varnish. The board and the affixed plate being withdrawn from the camera, are placed at an angle of about 45° within this box—the tablet with the picture downwards, so that it may be seen through the glass G. The box being carefully closed, the spirit lamp is to be lighted and placed under the cup containing the mercury. The heat is to be applied until the thermometer, the bulb of which is covered with the mercury, indicates a temperature of 60° centigrade, (140° Fahr.) The lamp is then withdrawn, and if the thermometer has risen rapidly, it

will continue to rise without the aid of the lamp; but the elevation ought not to be allowed to exceed 75° cent. (167° Fahr.)



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After a few minutes, the image of nature impressed, but till now invisible, on the plate, begins to appear; the operator assures himself of the progress of this development by examining the picture through the glass, G, by a taper, taking care that the rays do not fall too strongly on the plate, and injure the nascent images. The operation is continued till the thermometer sinks to 45° cent. (113° Fahr.) When the objects have been strongly illuminated, or when the plate has been kept in the camera too long, it will be found that this operation



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is completed before the thermometer has fallen to 55° cent. (131° Fahr.) This is, however, always known by observing the sketch through the glass.

After each operation the apparatus is carefully cleaned in every part, and in particular the strips of metal which hold the plate are well rubbed with rotten-stone and water, to remove the adhering mercury and iodine. The plate may now be deposited in the grooved box, (fig. 39), in which it may be kept, excluded from the light, until it is convenient to perform the last fixing operation.

FIFTH OPERATION.—This process has for its object the removal of the iodine from the plate of silver, which prevents the further action of the light.

A saturated solution of common salt may be used for this purpose, but it does not answer nearly so well as a weak solution of the hyposulphite of soda. In the first place, the plate is to be placed in a trough of water, plunging and withdrawing it immediately; it is then to be plunged into one of the above saline solutions, which would act upon the drawing if it was not previously hardened by washing in water.

To assist the effect of the saline washes, the plate must be moved to and fro, which is best done by passing a wire beneath the plate. When the yellow color has quite disappeared, the plate is lifted out, great care being taken that the impression is not touched, and it is again plunged into water. A vessel of warm distilled water, or very pure rain-water boiled and cooled, being provided, the plate is fixed on an inclined plane, and the water is poured in a continuous stream over the picture. The drops of water which may remain upon the plate must be removed by forcibly blowing upon it, for otherwise, in drying, they would leave stains on the drawings. This finishes the drawing, and it only remains to preserve the silver from tarnishing and from dust.

The shadows in the daguerreotype pictures are represented by the polished surface of the silver, and the lights by the adhering mercury, which will not bear the slightest rubbing. To preserve these sketches, they must be placed in cases of pasteboard, with a glass over them, and then framed in wood. They are now unalterable by the sun's light.

The same plate may be employed for many successive trials, provided the silver be not polished through to the copper. It is very important, after each trial, that the mercury be removed immediately by polish-

ing with rotten-stone powder and oil. If this be neglected, the mercury finally adheres to the silver, and good drawings cannot be obtained if this amalgam is present.

The above constitute the substance of the directions given by M. Daguerre, in his pamphlet and patent specification. The process has, however, been much simplified and shortened: the enormous expense of the original apparatus having been found quite unnecessary.

IMPROVED METHOD OF IODIZING THE SILVER, BY M. DAGUERRE.

The inventor has given some very decisive experiments, showing the necessity of using metal strips of the same kind as the tablet, or of cutting a deep line round it. He has shown that in using strips of copper, of glass, of gum lac, of card board, or of platina, the edges of the tablet are surcharged with iodine. M. Daguerre then states that, but for the difficulty of fixing them, the bands might be very much reduced in size; for it is sufficient for them to produce their effect that there be a solution of continuity between them, and this is proved by the fact that nearly the same result is obtained by engraving at the $\frac{1}{8}$ th of an inch from the edge of the plate a line deep enough to reach the copper. The objections to this are, that during the polishing process the engraving is filled with dust, and it retains water, which sometimes occasions stains. He then proposes, as a very great simplification of this process, that the plate be laid flat in a shallow box containing two grooves, one to receive the plate, and the other a board saturated with iodine. Around the plate he places a border of either powdered starch or lime, and the iodine *descends* from the board to the tablet. The starch or lime absorbs the iodine with avidity, and thus prevents its attacking the edges of the silver, and the vapor is diffused with perfect evenness over it.—Another advantage is, that the saturated board may be used for several days in succession, without being at all renovated.

M. Seguiet somewhat modifies even this process. A box of hard wood, varnished internally with gum lac, contains a lump of soft wood, furnished with a card of cotton sprinkled with iodine. Upon this is placed a plate covered with card-board on each of

its faces. One of these card-boards furnishes, by radiation, to the metal the vapor of iodine, while the other returns to the cotton that which it had lost. It suffices to turn the plate from time to time, in order that the operation may go on with equal rapidity. A plate of glass is placed upon the upper card-board, where it is not operated on. The plate is sustained a little above the charged cotton by frames of hard wood varnished with gum lac. By increasing the distance between the cotton and the plate, or the contrary, we are enabled to suit the arrangement to the temperature of the season, and thus always operate with facility and promptitude. M. Seguier also states, that a single scouring with tripoli, moistened with acidulated water, is sufficient to cleanse the plates thoroughly, and does away with the tedious process of scouring with oil, and afterwards the operation of heating the tablet over a spirit-lamp. M. Soliel has proposed the use of the chloride of silver to determine the time required to produce a good impression on the iodated plate in the camera. His method is to fix at the bottom of a tube, blackened within, a piece of card, on which chloride of silver, mixed with gum or dextrine, is spread. The tube thus disposed is turned from the side of the object of which we wish to take image, and the time that the chloride of silver takes to become of a greyish slate color will be the time required for the light of the camera to produce a good effect on the iodated silver.

Mr. Draper, of New York, acting on the suggestions of Mr. Towson relative to the adjustment of the focus, who published his views and experiments in the Philosophical Magazine for 1839, succeeded in accelerating his process so far as to obtain portraits from the life. He published his process in the London and Edinburgh Philosophical Magazine for September 1840. From this paper I shall take the liberty of making copious extracts. It was first stated that it was necessary, to procure any impression of human features on the daguerreotype plate, to paint the face white, or dust it over with a white powder, it being thought that the light reflected from the flesh would not have sufficient power to change the iodated surface. This has been shown to be an error, for, even

when the sun shines but dimly, there is no difficulty in delineating the features.

"When the sun, the sitter, and the camera, are situated in the same vertical plane, if a double convex non achromatic lens of four inches diameter, and fourteen inches focus be employed, perfect miniatures can be procured in *the open air* in a period varying with the character of the light from 20 to 90 seconds. The dress also is admirably given, even if it should be black; the slight differences of illumination are sufficient to characterise it, as well as to show each button and button-hole, and every fold. Partly owing to the intensity of such light, which cannot be endured without a distortion of the features, but chiefly owing to the circumstance that the rays descend at two great an angle, such pictures have the disadvantage of not exhibiting the eyes with distinctness, the shadow from the eyebrows and forehead encroaching on them. To procure fine proofs, the best position is to have the line joining the head of the sitter and the camera so arranged as to make an angle with the incident rays of less than ten degrees, so that all the space beneath the eyebrows shall be illuminated, and a slight shadow cast from the nose. This involves, obviously, the use of reflecting mirrors to direct the ray. A single mirror would answer, and would economise time, but in practice it is often convenient to employ two; one placed, with a suitable mechanism, to direct the rays in vertical lines, and the second above it, to direct them in an invariable course towards the sitter.

"On a bright day, and with a sensitive plate, portraits can be obtained in the course of five or seven minutes, in the diffused day-light. The advantages, however, which might be supposed to accrue from the features being more composed, and of a natural aspect, are more than counterbalanced by the difficulty of retaining them so long in one constant mode of expression. But in the reflected sunshine, the eye cannot bear the effulgence of the rays. It is therefore absolutely necessary to pass them through some blue medium, which shall abstract from them their heat, and take away their offensive brilliancy. I have used for this purpose blue glass, and also ammoniaco-sulphate of copper, contained in a large trough of plate glass, the in-

terstices being about an inch thick, and the fluid diluted to such a point, as to permit the eye to bear the light, and yet to intercept no more than was necessary. It is not requisite, when colored glass is employed, to make use of a large surface; for if the camera operation be carried on until the proof *almost* solarizes, no traces can be seen in the portrait of its edges and boundaries; but if the process is stopped at an earlier interval, there will be commonly found a stain corresponding to the figure of the glass."

"The chair in which the sitter is placed has a staff at its back, terminating in an iron ring, that supports the head, so arranged as to have motion in directions to suit any stature and any attitude. By simply resting the back or side of the head against this ring, it may be kept sufficiently still to allow the minutest marks on the face to be copied. The hands should never rest upon the chest, for the motion of respiration disturbs them so much as to bring them out of a thick and clumsy appearance, destroying also the representation of the veins on the back, which, if they are held motionless, are copied with surprising beauty.

"It has already been stated, that certain pictorial advantages attend an arrangement in which the light is thrown upon the face at a small angle. This also allows us to get rid entirely of the shadow from the background, or to compose it more gracefully in the picture; for this, it is well that the chair should be brought from the background, from three to six feet.

"Those who undertake Daguerreotype portraiture, will of course arrange the back-grounds of their pictures according to their own tastes. When one that is quite uniform is required, a blanket, or a cloth of a drab color, properly suspended, will be found to answer very well. Attention must be paid to the tint: white, reflecting too much light, would solarize upon the proof before the face had time to come out, and, owing to its reflecting all the rays, a blur or irradiation would appear on all edges, due to chromatic aberration.

"It will readily be understood, that if it be desired to introduce a vase, an urn, or other ornament, it must not be arranged against the back-ground, but brought for-

ward until it appears perfectly distinct upon the obscured glass of the camera.

"Different parts of the dress, for the same reason, require intervals, differing considerably, to be fairly copied; the white parts of a costume passing on to solarization before the yellow or black parts have made any decisive representation. We have therefore to make use of temporary expedients. A person dressed in a black coat and open waistcoat of the same color, must put on a temporary front of a drab or flesh color, or, by the time that his face and the fine shadows of his woollen clothing are evolved, his shirt will be solarized, and be blue, or even black, with a white halo around it. Where, however, the white parts of the dress do not expose much surface, or expose it obliquely, these precautions are not essential; the white collar will scarcely solarize until the face is passing into the same condition.

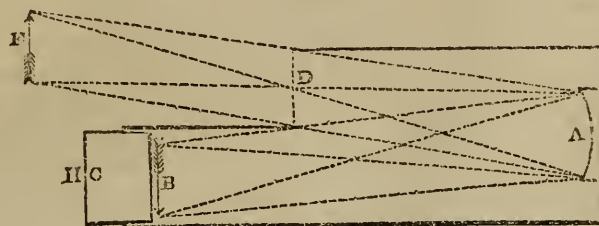
"Precautions of the same kind are necessary in ladies' dresses, which should not be of tints contrasting strongly.

"It will now be readily understood, that the whole art of taking daguerreotype miniatures consists in directing an almost horizontal beam of light, through a blue colored medium, upon the face of the sitter, who is retained in an unconstrained posture by an appropriate but simple mechanism, at such a distance from the back-ground, or so arranged with respect to the camera, that his shadow shall not be copied as a part of his body."

Professor Draper used a camera, having for its objective two double convex lenses, the united focus of which, for parallel rays, was only eight inches; they were four inches in diameter in the clear, and were mounted in a barrel, in front of which the aperture was narrowed down to three and a half inches, after the manner of Daguerre's.—He also adopted the principle of bringing the plate forward out of the best visible focus, into the focus of the violet rays, as was first suggested by Mr. Towson of Devonport, who also made many experiments, about the same period, with cameras having mirrors instead of lenses. A patent was taken out by Mr. Woolcott, a philosophical instrument-maker of New York, for a camera for portraiture, with an elliptical mirror: which form of apparatus was

also patented by Mr. Beard, in England, who having somewhat modified Dr. Draper's arrangements, succeeded still better in obtaining copies of "the human face divine."

A camera-obscura of this description is very easily constructed. Fig. 40 is a sectional view of the apparatus. At one end of a box, shaped as in the figure, and having an opening at D, is placed an elliptical



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mirror, A. The prepared plate B is fixed to the sliding frame C, by which it is adjusted to the best focus. The rays of light, radiating from a figure placed at F, will, it must be evident, pass through the opening at D, and fall on the mirror, as represented by the dotted lines, and will be thence reflected to the plate B.

The mirror has certainly the advantage of throwing a greater quantity of light upon the plate, but it has the great disadvantage of limiting the size of the picture. With a mirror of seven inches diameter, we only procure pictures which will be perfect over two square inches; whereas, with a lens of three inches diameter and fourteen inches focal length, pictures of a foot square may be worked. From this it will be seen that the mirror is only applicable where single objects are to be copied.

Eventually the sensibility of the surface of the plates was greatly increased. Mr. Goddard appears to have been the first to employ bromine in combination with iodine; and it was subsequently found by M. Claudet and others, that chlorine had an accelerating power, but not to the same extent as the bromine.

The following remarks by M. Daguerre on polishing and preparing the plates, from the *Comptes Rendus* of March 13, 1843, should be carefully attended to as the preliminary process upon which the success of every subsequent state depends.

"Since the publication of my process, I have not been able to occupy myself much with it. The investigations to which I devoted myself have been in an entirely new direction, and the experiments which they required were analogous with the preceding ones, only inasmuch as they were made on a metallic plate. However, I have lately

been so much struck with the unequal results which the impressions generally present—even those of persons who are especially occupied with them—that I determined to seek some means of remedying this serious inconvenience, which I attribute to two principal causes.

"The first relates to the operation of polishing, which it is physically impossible to effect without leaving on the surface of the plate traces of the liquid and of the other substances used in this operation: the cotton alone which is employed, however clean it may be, is sufficient to leave a film of dirt on the silver. This first cause constitutes a very great obstacle to the success of the impression, because it retards the photogenic action by preventing the iodine from coming in direct contact with the silver.

"The second consists in the alterations of the temperature of the air with which the plate is in contact, from the first operations to the mercurial operations. It is known that when a cold body is surrounded with warmer air it condenses its moisture. To this effect must be attributed the difficulty which is experienced in operating in a humid medium, especially when we come to the mercurial operation, which requires, to raise a suitable vapor, a temperature of at least 122° F.

"This vapor, which first heats the air contained in the apparatus, produces on the metal a dew which weakens the image. It is very evident that this humid layer is very injurious; since if, for example, the plate, on leaving the camera-obscura, be breathed on two or three times, the mercurial vapor can no longer cause the impression to appear.

"The water which is condensed, even at

the slightest difference of temperature between the surface of a body and the surrounding air, contains in solution, or in suspension, a non-volatile substance, which might be called atmospheric dust; and as soon as the equilibrium of temperature is established between the air and the surface of the body, the humid vapor which was condensed on it is volatilised, and depositing on it the dust which it contains, goes on to be re-saturated in the air with a fresh quantity of this impure substance.

"In order as much as possible to neutralise this effect, the temperature of the plate may be kept higher than that of the surrounding air, during each of the operations. But it is impossible to cause this heat to reach to 122° F., in order for it to be of the same temperature as the vapor of mercury, since, if the plate be exposed to that degree of heat after the operation of light in the camera-obscura, the image will be altered.

"I first tried to absorb the humidity of the air in the mercurial box by the usual means, such as lime, &c.; but these means are insufficient, and only complicate the process, without giving a good result.—Another means which has been proposed consists in vaporising the mercury under the pneumatic machine; by this process, truly, the dew on the plate is avoided, but the pressure of the air, which is indispensable to the impression, is suppressed. The results thus obtained, also, are always wanting in purity.

"The following is the process at which I have stopped, because it is very simple, and because it obviates the two inconveniences above mentioned; that is to say, it frees the silver as much as possible from all dirt or dust, and neutralises the humidity produced by the elevation of temperature in the mercurial box. By the first of these two effects it increases the promptitude, and by the second it renders the lights much whiter (especially by the application of M. Fizeau's chloride of gold): these two effects are always certain. The promptitude given by this process is to that hitherto obtained as 3 to 8; this proportion is accurate.

"This process consists in covering the plate, after having polished it, with a layer of very pure water, and heating it very strongly with a spirit-lamp, and in after-

wards pouring off this layer of water in such a manner that its upper part, where the dust which it has raised floats, does not touch the plate.

"MODE OF OPERATING.

"It is necessary to have a frame of iron wire of the size of the plate, having at one of its angles a handle, and in the middle, on the two opposite sides, two small cramp-irons, to retain the plate when it is inclined. After having placed this frame on a horizontal plane, the plate is placed on it, which is covered with a layer of very pure water, and putting as much water as the surface can retain. The bottom of the plate is afterwards very strongly heated, and very small bubbles are formed at the surface. By degrees these bubbles become larger, and finally disappear; the heat must be continued to ebullition, and then the water must be poured off. The operator should commence by placing the lamp under the angle of the frame where the handle is; but, before removing the frame, this angle must be very powerfully heated, and then, by gradually removing it by means of the handle, the water immediately begins to run off. It must be done in such a way that the lamp shall follow, under the plate, the sheet of water in its progress, and it must be only gradually inclined, and just sufficient for the layer of water, in retiring, not to lose in thickness; for, if the water were dried up, there would remain small isolated drops, which, not being able to flow off, would leave on the silver the dust which they contain. After that, the plate must not be rubbed: very pure water does not destroy its polish.

"This operation should be performed only just before iodising the plate. Whilst it is yet warm, it is placed in the iodising box, and, without allowing it to cool, it is submitted to the vapor of the accelerating substances. Plates thus prepared may be kept one or two days (although the sensibility diminishes a little), provided that several plates be placed opposite to one another, at a very short distance apart, and carefully enveloped to prevent change of air between the plates.

"OBSERVATIONS ON THE POLISHING OF PLATES.

"The plates cannot be too well polish-

ed. It is one of the most important points to obtain a fine polish; but the purity often disappears when substances which adhere to the surface of the silver are used,—such as the peroxide of iron, which has been very generally made use of for giving the last polish. This substance, indeed, seems to burnish the silver, and to give it a more perfect polish; but this polish is factitious, since it does not really exist on the silver, but in fact on a very fine layer of oxide of iron. It is for this reason that there is required for polishing them a substance which does not adhere to the silver; rotten-stone, which I recommended at the commencement, leaves less residue.

“As regards the liquid to be employed: in the first operations nitric acid of five degrees must be employed, as I stated in the first instance; but for the last operations it must be reduced to one degree.

“The polishing with oil and the heating may be suppressed.

“I take the opportunity afforded by this communication to lay before the Academy the following observations which I owe to experience:—

“The layer produced by the descending vapors of the iodine and of the accelerating substances, forms with silver a more sensible compound than is obtained with the ascending vapors. I make this observation only to lay down a fact, for it would be difficult to employ descending vapors, on account of the dust which might fall during the operation, and from stains.

“The resistance which light experiences in passing through a white glazing (*vitrage*) is well known. This resistance is even greater than it appears, and may be attributed not only to the dust which is left on the glazing in cleaning it, but also to that which is naturally deposited on it. The object glass of the camera-obscura is certainly in the same case. To ascertain this, I put the object-glass in cold water, which I boiled; I knew that it was impossible to remove it without the sides. This operation had, therefore, no other object than to raise the temperature of the glass to 212° F. C., and I then immediately poured on the two sides of the object-glass very pure boiling water to remove the dust. By operating directly with the object-glass, thus cleansed, I still further increased the promptitude. This means presents too

many difficulties to be put in practice; only care should be taken to clean the object-glass every day.

“The atmospheric dust, which is the scourge of the photogenic images, is, on the contrary, favorable to images which are obtained by contact or at a very short distance. To be convinced of this, we have only to clean the two bodies which we wish to put in contact with the boiling water, as I have just indicated, and to keep them both at the same temperature as the air; there will then be no impression, which evidently proves that these images have no relation with the radiation which gives photographic images.”

Without detailing any further the various stages of improvement which took place at short intervals, it is thought advisable to describe the forms of manipulation by which the most satisfactory images are obtained on the silver plates.

There are many varieties of accelerating liquids introduced, in all of which we have combinations in various proportions of either bromine and iodine, or chlorine and iodine, and sometimes of the three. These are known by the names of Eau Bromée, or Bromine Water, Bromide of Iodine, Redman's Sensitive Solution, Hungarian Liquid, and Woolcott's Accelerating American Fluid. In all cases, bromine, combined sometimes with chlorine, and iodine, is the accelerating agent. They all require to be diluted with water until about the color of pale sherry. The plate is exposed to the influence of the vapor in the same manner as with the iodine, but the color to be attained differs according to the solution employed. The following rules will guide the experimenter in using the different liquids. If bromide of iodine be used as the accelerating agent, the plate should remain over the iodine solution until it is of a deep yellow tint, and over the bromide till of a deep rose color. By observing the time of exposure necessary to render a plate sensitive, any number of plates may be prepared exactly alike, provided that the same quantity of the solution, always of an uniform strength, be put into the pan. By using a much weaker solution a longer exposure becomes necessary, but the plate becomes more evenly covered, and there is less danger of having too much or too little of the accelerator upon it. The same re-

mark may apply to other accelerating solutions. If Redman's solution, or the Hungarian liquid, a pale yellow and light rose will be found to answer best. As a general rule, if the yellow color produced by the iodine be pale, the red should be pale also; if deep, the red must incline to violet. When several plates are to be prepared at one time, the same solution will serve for all; but it seldom answers to preserve the mixtures for any time; and its use, after keeping, is one great cause of the failures which so annoy amateurs. The bromine contained in these solutions is very subtle, and escapes, leaving little else but iodine remaining, which will, after some little time, give a red color to the plate, without rendering it sensitive, entirely disappointing the expectations of the operator. Eau Bromée, or bromine water, which is very easily prepared, is extensively used on the Continent, and is simple in its use. If a certain quantity of an uniform solution be placed in the pan, for each plate prepared one observation will suffice to determine the time of exposure; if not, the color must guide the operator, varying according to the degree of color obtained over the iodine; thus, if the first color obtained be a light yellow, the plate should attain a full golden tint over the iodine, and may then be retained over the bromine until it acquires a rose color. If iodized of a golden yellow, then, in the second operation, it is taken to a pale rose, and in the third to a deep rose. If in the first of a full red, in the second to a deep red, and lastly to a grey; if the first to a deep red, in the second to a light blue, and in the third to a white, or nearly the absence of all color.

Experience, however, must invariably guide the operator, as scarcely any two solutions, though professedly the same in character, possess the same properties.

In a pamphlet published by M. Fizeau, bromine-water is recommended to be prepared as follows:—"To prepare a solution of bromine, of a fixed proportion and convenient strength to operate with, I, in the first place, made a saturated solution of bromine in water; this is prepared by putting into a bottle of pure water a great excess of bromine, agitating strongly for some minutes, and before using allowing the bromine to separate. Now, a definite quantity of this saturated water is to be mixed

with a definite quantity of plain water, which will give a solution of bromine always of the same strength: this mixture is conveniently made in the following manner:—The apparatus necessary is a *dropping tube*, which is also required for another part of the process, capable of holding a small definite quantity, and a bottle, having a mark to indicate a capacity equal to thirty times that of the dropping tube; fill the bottle with pure water to the mark, then add, by means of the dropping tube, the proper quantity of the saturated solution of bromine.

"The purity of the water is of some importance: the foregoing proportions refer to pure distilled water, and it is well known that the water of rivers and springs is not pure; but these different varieties can be used as absolutely pure water by adding a few drops of nitric acid till they taste slightly acid; two or three drops to the pint is generally sufficient.

"The liquid produced, which is of a bright yellow color, ought to be kept in a well-stopped bottle; it is the normal solution, and I shall call it simply bromine water, to distinguish it from the saturated solution.

"**BROMINE BOX.**—The box I employ for subjecting the plate to the vapor of the bromine water is constructed in the following manner:—It consists of a box lined with a varnish, which is not acted on by bromine; its height is about four inches; the other dimensions are regulated by the size of the plate, which ought to be at least half an inch all round, short of the sides of the box; it is composed of three separate portions—the cover, which is the frame holding the plate, the body of the box, and the bottom, upon which is placed the vessel for the bromine: this moveable bottom is slightly hollowed, so that the bromine vessel may always be placed in exactly the same position."

Few men have done more for photography than Fizeau, and in nearly all his suggestions he has been exceedingly happy: the bromine water thus prepared is used with the best effect by our most eminent daguerreotype artists.

Bromide of iodine is best prepared by the method of M. de Valicours, which is as follows:—"Into a bottle of the capacity of about two ounces, pour thirty or forty

drops of bromine, the precise quantity not being of importance. Then add, grain by grain, as much iodine as the bromine will dissolve till quite saturated. This point is ascertained when some grains of the iodine remain undissolved. They may remain in the bottle, as they will not interfere with the success of the preparation.

"The bromide of iodine thus prepared, from its occupying so small a space, can very easily be carried, but in this state it is much too concentrated to be used. When it is to be employed, pour a small quantity, say fifteen drops, by means of a dropping-tube, into a bottle containing about half an ounce of filtered river water. It will easily be understood that the bromide of iodine can be used with a greater or less quantity of water without altering the proportion which exists between the bromide and iodine."

Chloride of iodine appears to have been first employed by M. Claudet, and is prepared by merely placing iodine in an atmosphere of chlorine. Chloride of bromine is made by mixing two drachms of a saturated solution of bromine with fifteen drops of strong muriatic acid and about nine or ten ounces of water. The Hungarian mixture appears to be a similar compound to this.

For the following exceedingly convenient preparations we are indebted to Mr. R. J. Bingham, who has for some time, with much success, devoted his attention to the improvement of photographic processes.—The following extracts are from the *Philosophical Magazine* for October 1846:—

"AN IMPROVEMENT IN THE DAGUERREOTYPE PROCESS BY THE APPLICATION OF SOME NEW COMPOUNDS OF BROMINE, CHLORINE, AND IODINE WITH LIME.

All persons who have practised the daguerreotype must have remarked that in warm weather a considerable deposition of moisture takes place upon the glass or slate cover used to confine the vapor in the bromine or accelerating pan. This moisture must also necessarily condense upon the cold metallic surface of the plate during the time it is exposed to the bromine vapor. In fact, I have been informed by a number of professional daguerreotypists, (and I have experienced the difficulty myself) that they were unable to obtain perfect pictures

during the excessive heat of the late season; and a very clever and enterprising operator, who last year made a tour on the Continent, and brought home some of the finest proofs I have ever seen, entirely failed this season in obtaining clear and perfect pictures, from the constant appearance of a mist or cloud over the prepared surface. This appears to be caused by the deposition of moisture upon the plate, arising from the water in which the bromine is dissolved.—To obviate this, some have recommended the pan to be kept at a low temperature in a freezing mixture; and M. Daguerre, in a communication to the French Academy of Sciences, recommends the plate to be heated: but in practice both these plans are found to be unsuccessful. (See Lerebours *Traité de Photographie*.)

"It appeared to me, that if we could avoid the use of water altogether in the accelerating mixture, not only would the difficulty I have mentioned be avoided, but a much more sensitive surface would be obtained on the plate. With this view I endeavored to combine bromine with lime, so as to form a compound analogous to bleaching powder. In this I was successful, and find that bromine, chloride of iodine, and iodine, may be united with lime, forming compounds having properties similar to the so-called chloride of lime.

"The bromide of lime* may be produced by allowing bromine vapor to act upon hydrate of lime for some hours: the most convenient method of doing this is to place some of the hydrate at the bottom of a flask, and then put some bromine into a glass capsule supported a little above the lime. As heat is developed during the combination, it is better to place the lower part of the flask in water at the temperature of about 50° Fah.: the lime gradually assumes a beautiful scarlet color, and acquires an appearance very similar to that of the red iodide of mercury. The chloro-

* "I call this substance bromide of lime, although there is a difficulty as to the composition of bleaching powder, and which would also apply to the compounds I describe. Some chemists regard the *chloride of lime* to be a compound of lime, water, and chlorine. Balard thinks it is a mixture of hypochlorite of lime and chloride of calcium; and the view of Millon and Professor Graham is, that it is a peroxide of lime, in which one equivalent of oxygen is replaced by one of chlorine."

iodide of lime may be formed in the same manner: it has a deep brown color. Both these compounds, when the vapor arising from them is not too intense, have an odor analogous to that of bleaching powder, and quite distinguishable from chlorine, bromine or iodine alone.

"Those daguerreotypists who use chlorine in combination with bromine, as in Woolcott's American mixture, or M. Guérin's Hungarian solution, which is a compound of bromine, chlorine, and iodine, may obtain similar substances in the solid state, which may be used with great advantage. By passing chlorine over bromine, and condensing the vapors into a liquid, and then allowing the vapor of this to act upon lime, a solid may be obtained having all the properties of the American accelerator; or by combining the chloro-iodide of lime with a little of the bromide, a mixture similar to that of M. Guérin's may be produced: but I greatly prefer, and would recommend, the pure bromide of lime, it being, as I believe, the quickest accelerating substance at present known. By slightly coloring the plate with the chloro-iodide, and then exposing it for a proper time over the bromide, proofs may be obtained in a fraction of a second, even late in the afternoon. A yellow color should be given by the use of the first substance; and the proper time over the bromide is readily obtained by one or two trials.* With about a drachm of the substance in a shallow pan, I give the plate ten seconds the whole of the first day of using the preparation, and add about three seconds for every succeeding one. The compound should be evenly strewed over the bottom of the pan, and will last, with care, about a fortnight.

"The great advantage of this compound is, that it may be used continuously for a fortnight without renewal; and, unlike bromine water, its action is unaffected by the ordinary changes of temperature.

"I have hastened to communicate this

* "It is better to count time both over the iodine and the bromide of lime; the exposure of the plate to the iodine, after it has received its proportion of bromine, should be one-third of the time it took to give it the first coating of iodine. We have found that if less iodine than this be allowed to the plate it will not take up so much mercury, neither will the picture produced be so bold or distinct."

during the present fine weather, believing that it will be acceptable to all interested in the beautiful application of science."

By the employment of these agents, a sensitive coating is produced, upon which actinic changes are almost similar to those already named.

The time necessary for the plate to be exposed to the action of the bromine water must be determined by experiment, for it will vary according to the size of the box and the quantity of liquid used. It is ordinarily between thirty and sixty seconds, the time varying with the temperature of the atmosphere: when once determined, it will be constant with the same box, the same strength of solution, and the same temperature.

The method of coating the plate which is most approved, is as follows:—Place the pan upon a table, fill the pipette with bromine water, draw out a little way the glass slide, and allow the bromine water to run into the pan, and again close the vessel: the liquid must cover evenly the bottom of the pan; if not level, it must be adjusted; the level will be easily seen through the glass slide. When everything is thus arranged, the plate, previously iodized, is to be placed in its frame over the pan, the slide withdrawn, and the necessary time counted; after this has elapsed, the slide should be shut, and the plate immediately placed in the dark box of the camera.

For a second operation, this bromine water must be thrown away, and a fresh quantity used. The bottle containing the bromine water should be kept away from the direct light of the sun, and care should be taken that no organic matter fall into the bottle, such as grease, chips of cork, &c. These enter into new combinations with the bromine, and lead to error as to its amount in solution.

When bromide of iodine or the chloride are used, every precaution must be adopted to secure a uniform coating; and the methods suggested by Daguerre are the best which can be recommended. When the plate has been exposed in the camera the proper time, it is subjected, as already directed, to the action of mercurial vapor; and then, being washed with the hyposulphite of soda, subjected to M. Fizeau's process of fixing with solution of gold.

The process, as described by M. Fizeau, is as follows :—

“Dissolve eight grains of chloride of gold in sixteen ounces of water, and thirty-two grains of hyposulphite of soda in four ounces of water; pour the solution of gold into that of the soda, a little by little, agitating between each addition. The mixture, at first slightly yellow, becomes afterwards perfectly limpid. This liquid now contains a double hyposulphite of soda and gold.

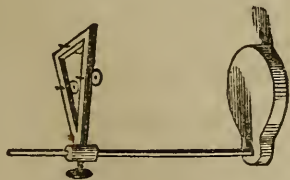
“To use this salt of gold, the surface of the plate should be perfectly free from any foreign substance, especially dust; consequently it ought to be washed, with some precautions which might be neglected if it was to be finished by the ordinary mode of washing.

“The following manner generally succeeds the best: the plate being yet iodized and perfectly free from grease on its two surfaces and sides, should have some drops of alcohol poured on the iodized surface; when the alcohol has wetted all the surface plunge the plate into a basin of water, and after that into a solution of hyposulphite of soda.

“This solution ought to be changed for each experiment, and to consist of about one part of the salt to fifteen of the water: the rest of the washing is done in the ordinary way, only taking care that the water should be as free as possible from dust.

“The use of the alcohol is simply to make the water adhere perfectly all over the surface of the plate, and prevent it from quitting the sides at each separate immersion, which would infallibly produce stains.

“When a picture has been washed, with these precautions, the treatment with the salt of gold is very simple. It is sufficient to place the plate on a support, fig. 41,



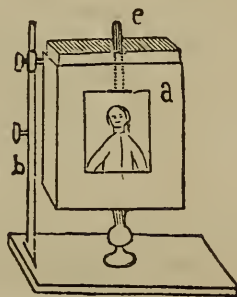
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and pour upon its surface a sufficient quantity of the salt of gold that it may be entirely covered, and heat it with a strong spirit-lamp; the picture will be seen to

brighten, and become, in a minute or two, of great force. When this effect is produced, the liquid should be poured off, and the plate washed and dried.

“In this operation the silver is dissolved, and the gold precipitated upon the silver and mercury, but with very different results; in effect the silver, which by its reflection, forms the shades of the picture, is some way darkened by the thin film of gold which covers it, from which results a strengthening of all the darks. The mercury, on the contrary, which, in the state of an infinite number of small globules, forms the lights, is augmented in its solidity and brightness, by its union with the gold, from which results a great degree of permanency, and a remarkable increase in the lights of the picture.”

The plates are then washed by means of an arrangement of this order. The apparatus represented in fig. 42 may be employed.



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ed. *a* is a vessel sufficiently large to take the plate, and not more than half an inch wide: this is filled with distilled water, which is heated by means of a spirit-lamp; *b* is a stand supporting the trough, and *c*, a holder for the plate. After the plate has been immersed for a few minutes, it is to be drawn out slowly, and by blowing on it the water is removed, and the warm metal rapidly dried. Such are the principle processes which have been adopted in the daguerreotype manipulation. Other modes for giving permanency to the daguerrean image have been adopted, but none of them have been so thoroughly successful.

It appears advantageous to quote a few of the modified forms of proceeding for fixing these pictures, when obtained, which have from time to time been recommended.

Extract of a Letter from M. Prescot to M. Arago.

In one of the sittings of last month you

mentioned a process for fixing photogenic images on metal. Knowing, as I do, the interest you take in the beautiful discovery of the daguerreotype, I hope you will excuse the liberty I take in troubling you with results which I obtained in experiments made a few months ago.

Photogenic images, obtained by M. Daguerre's process, may be fixed by treating them with a solution of hydrosulphate of ammonia. For this purpose, a concentrated solution of this fluid is mixed with three or four volumes of pure water, which is poured into a flat vessel, in sufficient quantity that the plate may be steeped in it horizontally, and just covered with the fluid. When, by the action of the fluid, the tints of the drawing are sufficiently changed, which occurs in less than a minute, the plate is to be withdrawn and put into a flat vessel containing water: it is afterwards taken out and dried. By this process the polished parts of the metal are tinged grey by the sulphuret, and the amalgamated parts are not attacked,—or, at least, but very little. The tints may be varied by the concentration of the fluid or the duration of the immersion: however, too long an action turns the lights yellow. Photogenic images, treated in this manner, bear rubbing with the finger without losing any of their details.

M. Choiselat proposed a plan which has been rarely acted upon, but which is well deserving of all attention.

Chloride, and particularly iodide, of silver, dissolved in hyposulphite of soda, may be advantageously employed for fixing the images of the daguerreotype. Steeped in these solutions, they are under the electrochemical influence exerted by the copper on the dissolved silver, and thus became ineffaceable.

Instead of the hyposulphite, a mixture of iodide, bromide, &c., of potassa, may be employed.

The iodide of silver best adapted for this operation is that which is obtained by treating, with the aid of heat, a plate of this

metal by the iodide precipitated from alcohol by water, afterwards dissolving the iodide formed and adhering to the plate of the hyposulphite.

Upon the suggestion of Mr. Towson, who published his paper in the *Philosophical Magazine* for 1839, a new mode of adjusting the focus was introduced, by which the difference between the chemical and luminous rays was allowed for, and to this was mainly due the acceleration of the process sufficiently to obtain pictures from the life.

Dr. Berres, of Vienna, assisted by Mr. F. Kratochwila, has succeeded by another process, bearing some analogy to that of M. Fizeau, in fixing the daguerreotype designs. He takes the photograph produced in the usual manner by the process of Daguerre, holds it for a few minutes over a moderately warmed nitric acid vapor, and then lays it in nitric acid of 13° or 14° Réaumur ($61\frac{1}{4}^{\circ}$ or $63\frac{1}{2}^{\circ}$ Fahrenheit,) in which a considerable quantity of copper or silver, or both together, has been previously dissolved. Shortly after having been placed therein, a precipitate of metal is formed, and can be changed to any degree of intensity. The photographic picture coated with metal is now removed, washed in water, cleaned, and dried; it is then polished with chalk or magnesia, and a dry soft cloth or leather, after which the coating will become clean, clear, and transparent, so that the picture with all its properties can again be seen.

The following experiment for the simplification of the daguerreotype processes, which were made by me many years since, do not appear to be entirely uninteresting; the original paper is therefore retained, with a few verbal alterations only.

The extreme expense of the apparatus and plate as supplied by the patentee, induced me, in the very first stage of my experiments, to endeavor to construct for myself a set which should be equally as effective, and less expensive.

TO BE CONTINUED.

A NEW THEORETICAL AND PRACTICAL TREATISE
ON PHOTOGRAPHY UPON PAPER AND GLASS.*

BY GUSTAVE LE GRAY.

Translated from the French by J. R. Snelling, M. D.



HIS is at a relative distance behind the lens and always greater than its *principal focus* which forms the image of objects placed before its visual axis. All know that this image is inverted, and generally small. Although an image may be formed, it is necessary that the object reproduced should not be at a less distance from the lens than its principal focus. At this distance the image is formed generally much larger than the refracted object. To enlarge the image it is necessary to diminish the distance of the object from the lens, and increase the distance to diminish the size of the object. We can vary these effects much by using lens of different focal lengths. The shorter the focus of the lens is, the larger will be the image obtained.

§ 43. A convex lens added to another lens increases its magnifying power. A concave lens, on the contrary, diminishes it. I have applied this principle for changing at pleasure the focus of an object-glass simple or otherwise, in a very economical manner. It is only sufficient to adapt behind the diaphragm in a small barrel the common spectacle glasses. Those which serve a good purpose generally are Nos. 50 to 100, as well for the convex as for the concave; these numbers give the length of the foci in inches; for the first, it is the *principal focus*; for the second, it is the *virtual focus*.

Simple lenses when combined for the purposes of photography, bear the name of object-glasses. M. Secretan, one of the most able opticians, thus describes the object-glass.

In the most general acceptation of the term, we understand by the word, object-glass, a system or assemblage of lenses de-

signed to produce at some distance the image of an object placed at the end of said system. If the system is only composed of a single lens, the image is necessarily defective. If we form two lenses in contact of different densities, the image will be free from foreign colors and much more clear. In this case, the object-glass is called *achromatic*, and cannot be properly styled simple, since it is composed of two lenses. If the system be formed of two simple achromatic object-glasses placed at some distance from each other, we then say that the object-glass is double. Such are the only combinations of glass employed in photography at the present time. For an object-glass to be perfect, it must fulfil many conditions; thus the image produced must be perfectly clear and luminous over a great extent; the straight lines must preserve their uprightness in the image, even towards the edges of it; and the chemical and visual focus should be blended. The best object-glass is that in which these conditions have been sufficiently attained. A photographic object-glass without some defect, may be regarded as a *chef d'œuvre* of the optician, and will always be perhaps a kind of philosopher's stone to them.

LIGHT.

§ 44.—Light is the principal agent employed in photography. It is that which effects the decomposition of bodies which we employ as an impressionable preparation.

Light has an intimate relation with electricity. Is it a body by itself, or is this merely one of its effects? This is a question which I shall not attempt to describe.

I shall only consider light with reference to photographic operations.

Its principal action is to effect deoxidation—the reduction of certain metallic oxides. It is thus that it acts with the chlorides and iodides of silver. A sheet of

* Continued from page 248, Vol. 4, No. 4.

paper covered with chloride of silver, and exposed a certain time to the solar rays will finally become completely coated with silver, and in this state will even bear burning.

That which is produced by the solar rays, is likewise produced by the feeble light of a candle; but in a much longer time. In both cases, the oxygen of the oxide of silver is carried off by the action of light which I maintain has been carried off and consumed in the first instance by the burning body—by the sun which is a planet in combustion—and in the other, by the flame of the candle. I define light as being the emanation, the action of a body in combustion.

Combustion produces in air the same effect as a galvanic current in a metallic bath. There is displacement of molecules in a direct line with the force of attraction.

A body cannot burn without consuming a large quantity of the oxygen of the air. Thus the sun the agent from which emanates the most brilliant light, being an immense planet in combustion, must carry off and consume in the atmosphere an incalculable quantity of oxygen. A vacuum is formed, which is immediately filled up by fresh oxygen rising to still higher beds, which is also followed and replaced by a new supply of oxygen, and so on in order until the light reaches us.

If we present to the luminous radiation a body which contains oxygen in a very small quantity, and in which the affinity between it and the body which holds it in combination is very weak—more feeble than the force of attraction for the body in combustion, which is the case with the salts of silver—the oxygen will be carried off to replace that taken from the atmosphere by the body in combustion.

After this reasoning, we ought to term light an electric current, produced by continual displacement, in a direct line, of the oxygen of the air.

Every ray of light of a white color is composed of seven colors, which are the red, orange, yellow, green, blue, indigo and violet in their order of production by the solar spectrum. These seven rays which compose one luminous ray, in passing through mediums more or less dense are refracted in an unequal manner, consequently, in their passage through a sim-

ple lens, not achromatic, the foci are different. Thus, by placing to the focus the image of an object obtained with one such lens, we can obtain the colored fringe of this image either red, yellow or blue, &c., according as the focus chosen shall be that of such or such ray. It is this property of light which constitutes the want of achromatism of a lens composed of one kind of glass alone. We remedy this defect by the union of two glasses.

It is with the aid of a prism that we effect the decomposition of a ray of white light; the image produced bears the name of *solar spectrum*.

In their chemical action upon our sensitive matter, the violet rays of the spectrum are those which have the greatest power. This action is particularly intense at the border of the rays. These violet rays attack the oxygen of the metallic oxides; the red rays, on the contrary, restore it. Chloride of silver blackened, becomes white under the influence of a red ray of the spectrum.

§ 45. Might we not take advantage of this property for obtaining a positive proof immediately in the camera? It would only be necessary to deoxidize very slowly with the light a sheet of sensitive paper, and then expose it in the camera furnished with a lens of red glass. I purpose to examine this question as soon as I can procure a suitable red glass. The chemical action of the rays of the spectrum are therefore increased in the order of their production from red to violet.

NITRIC ACID.

§ 46. We obtain nitric acid by distilling saltpetre or nitrate of potash with oil of vitriol. The oil of vitriol, which is a hydrate of sulphuric acid, unites with potash in this decomposition and forms sulphate of potash, displacing nitric acid, which last brings off the water of the oil of vitriol, and is consequently also a hydrate.

This acid is found abundantly in commerce, and I shall not enter into any fuller details upon its manufacture. It is used in our operations to form the nitrate of silver (§ 47) and the chloride of gold by its union with hydrochloric acid (§ 72.)

We may also employ it to blacken positive proofs after their immersion in the hy-

posulphite of soda. Its action is then the same as hydrochloric acid in the same instance (§ 67.)

Its presence and its direct action in the sensitive preparations would be very bad, for notwithstanding all the precautions we might take, the salts in the composition into which it enters would be decomposed and rendered entirely neutral.

NITRATE OF SILVER.

§ 47. The purest nitrate of silver is that obtained by means of chloride of silver. Dissolve first one part of metallic silver, with three parts of nitric acid in a glass retort which you heat with a sand bath or by the aid of a spirit-lamp. You can also use, to make this solution, a porcelain crucible, and cover it over with a glass funnel, turning the neck up so as to form a kind of chimney for the escape of the gas. Take care to put the lamp in a basin which may receive the silver solution in case that the retort should break. The solution being effected, evaporate, and then let it cool, after which, add the water, filter the solution, and then pour in gradually a solution of chloride of sodium, which precipitates chloride of silver, a further addition of chloride no longer produces a precipitate, stop pouring in any more and let the chloride of silver settle at the bottom of the vessel. Then decant the remaining liquid; wash several times and also decant in like manner this chloride of silver in a large *eprouvette*, in such a manner as to remove all the soluble salts, after which you may wash it with water slightly acidulated with muriatic acid. Then plunge into it a strip of iron or zinc. This disengages the hydrogen, reducing the chloride of silver by little, and after a few minutes there is nothing left but the metallic silver.

The silver thus obtained, in the form of a grey powder must be washed in water acidulated with muriatic acid, as when crystallizing to the state of nitrate of silver, by evaporating with a gentle heat. When this operation is almost finished, it is well to add the metallic silver, reduced from the chloride, in order to obtain the nitrate completely neutral. By letting it remain for a day, crystals are formed. Re-dissolve again with distilled water, filter, and by evaporating and re-crystallizing, you obtain

the nitrate of silver perfectly white and neutral, very suitable for photography.

However, I think it would be better, instead of crystallizing the second time, to simply evaporate it and heat it to redness. It would consequently be much more neutral; then, losing also a little oxygen, it would give a more rapid image. Yet it would be necessary to be always careful in making a solution for use, to filter it before using, in order to free it from any precipitate of reduced silver which it might contain.

Nitrate of silver is silver at its maximum of oxidation. It is alone sensible to the action of light; but the salts of the protoxide of silver, which it furnishes with the chloride, iodide, bromide, fluoride, cyanide of potassium, &c., are of a much more exquisite sensibility, seeing that the two equivalents of nitrogen and the five of oxygen, composing the nitrate of silver are replaced by the iodine, cyanogen, fluorine, chlorine, &c., which contain no oxygen.

From the theory given in the chapter upon light, (§ 44) we will understand that the nearer the salts of the protoxide of silver obtained approach to the suboxide the less time will it take for the light to carry off the oxygen, the more rapidly will be the formation of the image and the more intense will be the blacks.

Thus is it, for this reason, that the bicarbonate of potash, caustic potash, the cyanide and fluoride of potassium, ammonia, &c., added to iodide of potassium in the first preparation of the paper, give celerity, because they respectively form in the paper when you put it upon the nitrate of silver, the intermediate salts in an atomic manner between the protoxides and suboxides of silver.

As soon as the light strikes the preparations in these conditions, they pass into the intermediate degrees between the protoxides and suboxides and the reduced metallic silver, which are precipitated of a black color by the gallic acid, while the degrees between the protoxide and binoxide are not passed.

The precipitate formed by gallic acid will be much darker in proportion as the decomposition produced by light restores the protoxide to a more determined state of suboxide or reduced metallic silver. The

protoxides and the binoxides, on the contrary, will give tints more or less clear.

From these facts, as well as those contained in the preceding chapter, we can readily see the course to be pursued for ascertaining the accelerative agents. All those described heretofore accord with this theory, as I shall demonstrate hereafter. The way pointed out by M. Henneman in England, of exposing iodide of silver to the sun, after applying it beforehand upon the paper with an excess of iodide of potassium, did not produce acceleration, because this exposition carried off a part of its oxygen and placed it almost in the state of suboxide, in such a manner, that when it was afterwards put again upon the nitrate of silver, it forms a salt as near the state of suboxide as of protoxide.

NITRATE OF ZINC.

§ 43. Nitrate of zinc is obtained by dissolving small pieces of zinc in dilute nitric acid, which occasions a lively effervescence. We heat it slightly and filter to free it from a little iron and carbonaceous matters which remain upon the filter. The liquid then gives by evaporation crystals in the form of four-sided prisms, which attract moisture from the air.

This salt is added to the aceto-nitrate of silver and plays nearly the same part as nitric acid. It appears to increase a little the sensibility of the sensible coating and preserve the whites of the proof by precipitating into the texture of the paper a white oxide of zinc, insoluble in water, which will close up all the pores of the paper.

It must not be left long in the iodide bath, because the precipitate might be redissolved in the alkaline solution. After taking the paper from the bath, we hang it up to dry, and use it upon the ordinary aceto-nitrate of silver (§ 11.)

GALLIC ACID.

§ 49. To obtain this acid, macerate in five parts of distilled water one part of pulverized nut galls. After two or three months maceration effected in a cellar at a temperature of 15 or 20 degrees, bring the whole of it to the air and let it dry completely. Treat it then with boiling alcohol, which dissolves only gallic acid, which upon cooling, settles under the form of

silky crystals. To have it still purer, we may first treat with water the macerated nut-galls, precipitate the tannin with albumen, evaporate the water, and then resubmit it to boiling alcohol.

Gallic acid is employed to develop the negative proof, restoring the blacks by its combination with the salts of silver, which have lost their oxygen by the action of light.

All the salts of silver, in general, which are in the state of suboxide or nearly in the metallic state, are precipitated of a dark brown color by this acid. Thus, we may employ proofs made upon the chloride, bromide, fluoride, cyanide, &c., as well as those made upon the iodide of silver.

Contrary to the opinion of several eminent photographers, who have sought to concentrate the solution of gallic acid, whether by solution with alcohol or by the addition of bodies, for the purpose of bringing out the image more rapidly, I think that at least in a very pressing case, it would be better to employ a weak solution—2 to 4 grammes of acid to the litre of distilled water. By this method, you spot the proof much less; and if it requires much more time to develop it, you are very amply repaid by the beauty of the image.

The saturated solution has the inconvenience of including in the proof crystals of gallate of silver which spot it. When the proof is almost entirely developed, you may add a little aceto-nitrate of silver, the blacks immediately becoming more intense; but it is necessary to watch the proof well, as it is liable to become too black in a short time, forming a precipitate of gallate of silver almost immediately.

Heat also hastens the action of gallic acid upon the proof, for it tends to reduce the oxides of silver, at the same time that it places in closer contact the different molecules of substances. The temperature, however, must not be raised more than 30 or 40 degrees, a greater heat having a tendency to reduce the salts of silver, and, consequently, spoil the proof.

M. Regnault, of the Academy of Sciences, has lately directed attention to the pyro-gallic acid for developing the negative image in a much more energetic manner than with the simple gallic acid.

Pyro-gallic acid is obtained by heating

gallie acid or pulverized nut-galls in a basin or a porcelain capsule, covered over with a glass bell. Crystals of pyro-gallie acid sublime upon the walls of this bell. It is necessary to control the heat so that it may not rise during the operation higher than a temperature of 200 degrees, in order not to decompose the acid.

§ 50. This acid is prepared with the impure acetic acid of commerce which is obtained from the distillation of wood, and which bears the name of pyroligneous acid.

Reduce the pyroligneous acid into acetate of soda, by saturating it first with chalk, and then decomposing the acetate of lime, which is formed by the decomposition of sulphate of soda. You thus obtain the acetate of soda and the insoluble sulphate of lime. Then filter, evaporate the solution to dryness, and test the salt formed, by igneous fusion, which destroys the foreign matters without altering the acetate. Afterwards distil one part of this acetate of soda and three of sulphuric acid, and throw down the first third of the liquid, which distill; the other two-thirds, which are the concentrated acetic acid are again distilled with acetate of soda, in order to free them from the sulphuric acid which has been taken up.

To concentrate with advantage this acetic acid, lower the temperature by putting the vessels which contain it in a cooling mixture. The more concentrated part of the acid will, by this means, form abundant crystals, which separate from the weak liquid acid. By liquifying this acid several times by heat and re-crystallizing by cold, and decanting to free it from aqueous acid, you can obtain it more and more concentrated.

Acetic acid is used in photography in union with the nitrate of silver solution, for the purpose of aiding the decomposition of iodide of potassium, and also to promote the absorption of compositions into the substance of the paper. A sheet of iodized paper placed upon the aceto-nitrate of silver, occasions the following reaction; the iodine is decomposed by the nitrate of silver under the energetic action of the acetic acid, the silver unites with the iodine in the paper to form the insoluble iodide of silver, which take up a little acetate of silver, and the potash of the iodide forms nitrate of potash in solution with the

mother water. A very old solution of aceto-nitrate of silver is much more sensitive than a new one, because the acetic acid carries off a little oxygen with the nitrate of silver, occasioning the formation of metallic silver which is deposited, and of carbonic acid, which evaporates.

§ 51. To prepare the paper with this product, you must soak it first in a solution of carbonate of soda, let it dry, and then place it upon a solution of nitrate of silver. A carbonate of silver is thus formed in the paper. By afterwards putting this paper upon a bath of acetic acid diluted with water, the carbonate of silver is converted into nitrate of silver with the disengagement of carbonic acid. Still, you must not leave the paper upon the bath of silver except for a very short period, in order not to allow of sufficient length of time for the acetate of silver to be dissolved. This paper, exposed in the camera, gives a proof, which is developed by gallic acid.

ACETATE OF AMMONIA.

§ 52. We obtain this salt by adding directly liquid ammonia with acetic acid to saturation. The solution is heated with effervescence. After waiting for it to cool, we add one or two drops of acid, in order to assure ourselves that the liquid is no longer alkaline, which is the case when no effervescence is produced.

This substance was pointed out by M. Humbert de Molard for accelerating the development of the negative proof upon gallic acid. Its action is to continue the reduction commenced by light; but, unfortunately this reduction often reaches the mass of the proof and the liquid, producing black precipitates which spot the whole. However, with caution and prudence we can obtain good results with this body, and it may be advantageously used in certain cases when we might desire to develop an image rapidly, especially in the preparation of negative paper with hydriodate of ammonia (§ 57.)

Although this method of acceleration has been employed by several operators, and has given them quite satisfactory results, I, notwithstanding, have an entirely different opinion upon this subject.

I do not think it necessary to employ powerful means of acceleration in the de-

velopment of the image by gallic acid, except very seldom, indeed.

The image will always come out more beautiful, more harmonious, and with the whites better reserved if the effect be produced very slowly. It is absolutely the same with this, as with silver plating or galvanic gilding—the weaker the galvanic pile is, the more regular, solid and constant is the result. For this reason, I rather advise that the gallic acid should not be saturated with the acetate of ammonia.

ACETATE OF LIME.

§ 53. This salt is obtained in the state of greatest purity by treating lime with acetic acid. The solution obtained is filtered and evaporated to dryness; and the igneous fusion which would decompose the salt must be avoided.

It is employed in union with gallic acid to develop the image very rapidly. This addition admits of the solution of a much greater quantity of gallic acid in a given volume of water, as mentioned by M. Delaborde.

It seizes upon a part of the oxygen of the protoxide of silver which is in the negative proof and decomposes the iodide of silver, forming acetate of silver and iodide of lime. One part of acetic acid is consumed by the oxygen which quits the oxide of silver to unite with the water and carbonic acid which combines with the lime, and the reduced silver is precipitated of a black color by gallic acid. This action takes place especially in parts which have been impressed by light; this body facilitates therefore the development of the image. If we should combine too large a quantity of acetate of lime with gallic acid, the decomposition would be too energetic, and the whole proof would grow dark under the reaction of the gallic acid.

I would make the same observations for this body, which I have made at the end of § 52.

ACETATE OF LEAD.

§ 54. This salt is obtained by treating litharge in acetic acid with excess of acid, and evaporated slowly and suffered to crystallize. The crystals washed and dried are perfectly pure.

The solution of this salt with gallic acid is effected in very near the same manner

as the acetate of lime § 53; only it forms the iodide and carbonate of lead, and it is more liable to spot the proof.

The negative proof obtained by this method becomes extremely coarse and has a very peculiar metallic character, which has a good effect for a proof which has been exposed for a very short time.

Acetate of lead added to hyposulphite of soda, produces quite a good result for fixing positive proofs.

By changing the proportions from 5 to 25 grammes with 100 gr. of hyposulphite of soda, we obtain red and violet tints, or very warm and powerful blacks.

IODIDE OF POTASSIUM.

Hydriodate of Potash.

§ 55 Iodide of potassium is obtained by dissolving iodine in solution of potash till neutral, evaporating to dryness and calcining in a platina crucible to decompose the iodate of potash formed. The residuum is the iodide of potassium which is redissolved in the water and crystallized. We can, moreover, obtain this salt by decomposition, pouring in syrup of iodide of iron, (§ 57) boiling a solution of sub-carbonate of potash, but taking care not to put in an excess of alkalies. Iron is precipitated, and the iodine unites with the potash to form the iodate which is changed into iodide by calcination.

Iodide of potassium is solid and crystallizes in cubes or rectangular prisms, which are generally white and opaque. However, if it were slightly tinged of an extremely pale violet color, it would be not the less good.

Iodide of potassium is one of the principal chemical agents in photography. It serves to form the iodide of silver which is the chief sensitive coating in the formation of the image. The oxygen of the protoxide of silver comprising it, has its affinity for the silver, almost neutralized by the iodine, and leaves it to the somewhat prolonged action of light.

§ 56. Iodide of silver is insoluble in water. Nitric acid and ammonia dissolve it very slightly. Muriatic acid changes it to chloride of silver. Its true solvent is hyposulphite of soda (§ 74); so is it the only salt which we ought to employ in fixing negatives. Yet the iodide of potassium dissolves it also, and it would there-

fore serve as well to fix proofs in certain cases.

We make use of this property of iodide of potassium (dissolving iodide of silver by adding it in excess,) for the purpose of laying over the paper a coating of iodide of silver by a single operation. The following, is the most simple method of preparing this paper: Pour 20 gr. water upon 13 gr. nitrate of silver. The solution being made, pour in drop by drop a saturated solution of iodide of potassium, until the yellow precipitate which has been formed, is redissolved. Then impregnate one surface of the paper with this solution and hang it up by one of the corners to dry. Afterwards wash it in several waters and also leave it to soak some time. Finally withdraw it and dry it definitively.

The paper is then of a citron yellow color; and it is necessary to expose it in this state one or two hours to the sun. It grows pale a little and parts with its oxygen. Thus prepared, it may be preserved indefinitely and employed as other papers by submitting it first to the action of nitrate of silver (§ 11) and by continuing the order of operations described.

HYDRIODATE OF AMMONIA.

§ 57. Hydriodate of ammonia may be prepared by putting in a glass retort two parts of iodine with ten parts of distilled water. Add gradually, in very small quantities at a time, one part of iron filings. The combination soon takes place. The iodine dissolves with the production of heat to form an iodide of iron which remains in solution in water. Heat it moderately with the spirit-lamp until the combination is finished, of which you may be convinced when the liquid ceases to redden white paper. Carry the filtered solution to the boiling point; precipitate the iron by a solution of carbonate of ammonia; filter, and then evaporate the liquid in order to crystallize it. This salt is very inconstant for it repeatedly quits the ammonia. To preserve it, there must always be kept suspended in the bottle which contains it a little bottle of carbonate of ammonia.

The aqueous solution, upon becoming old, leaves a black precipitate, consisting of the fulminating iodide of nitrogen, which is very dangerous. You must be very

careful not to let it dry, since it might produce fatal accidents to the operator.

Papers prepared simply in a solution of hydriodate of ammonia, and then in acetonitrate of silver, admit of a very rapid image which is developed very energetically by gallic acid, to which acetate of ammonia has been added, as described by Humbert de Molard.

The rapid production of the image is owing to the presence of hydrogen, which, *étant mis à nu*, by the action of light, contributes to reduce the oxide of silver in a measure to the metallic state.

The accelerative character of hydrogen, depends upon the property which this gas possesses of reducing the oxides to the metallic state.

The paper should not be prepared long before it is used, because then it would lose its sensibility by the evaporation of a part of its ammonia which is continually disengaged.

BROMIDE OF POTASSIUM.

§ 58. You can prepare this salt by pouring an aqueous solution of potash in an ethereal solution of bromine until the ether is rendered colorless.

Let it stand for a short time. The ether swims on top. You therefore decant it from the aqueous solution which contains the bromide and bromate of potassium. Evaporate this solution to dryness, and heat it to redness. The bromate of potassium parts with its oxygen and is changed into bromide of potassium. Dissolve in distilled water and crystallize by evaporation. The crystals are white, in the form of cubes or quadrangular prisms.

Bromide of potassium serves to form the bromide of silver, a pale yellow precipitate which is very sensitive to light, but less, however, than iodide of silver. It is insoluble in water, alcohol and nitric acid, but ammonia and the alkaline hyposulphites dissolve it perfectly.

Bromide of silver is affected by light and gallic acid in very near the same manner as iodide of silver, only the blacks obtained are less brown and turn more to a dark blue, and the whites or parts not altered by light are preserved perfectly pure.

§ 59. By mixing the bromide of potassium with chloride of sodium in preparing the positive paper you obtain the proofs of a

greyish black color with a very pleasing effect. Employ the following formula: Distilled water, six parts; bromide of potassium, one part; chloride of sodium, one part. The solution of nitrate of silver is the same as that described at § 20, and the rest of the operation is likewise the same.

§ 60. Bromide of potassium has been used and is still used unfortunately for fixing negative proofs. It is a very bad fixer, leaving all the impressible matters in the proof, which cannot bear the drawing of several positives without becoming black by light.

We will describe the effect which is produced: assume that a negative proof when withdrawn from gallic acid and washed with water, contains in the parts impressed by light, the gallate of silver changed from the suboxide, and in the lights or parts not impressed, the cyano-fluori-iodide of silver holding a little gallic acid in suspension, and, consequently, it is extremely impressible to light. By plunging this proof in a solution of bromide of potassium, we remove nothing, but the oxides of silver take up some equivalents of bromide, which remaining in excess, forms a sufficiently powerful base by its affinity for the oxides of silver, to counter-balance the action of light which tends to carry off the oxygen. So, if we make a positive proof for the first time with a negative thus fixed, the negative does not appear to change, because the action of light is at first slow upon this preparation, yet it nevertheless exists. By repeating this drawing several times we are astonished to see how much the negative is spoiled. It is covered with a uniform dark tint which then rapidly increases in intensity.

Whenever we wish to preserve a negative for more than two or three proofs, we must be very careful to avoid this mode of fixation, but rather have recourse to hyposulphite of soda.

BROMIDE OF AMMONIA.

§ 61. We obtain this salt by pouring ammonia into a large dish and putting at the side of it an unstoppered bottle of bromine, then covering over the whole of it a glass bell. The ammonia absorbs the bromine vapors, and after a while we remove the liquid from the dish, and by evapora-

tion obtain crystals of bromide of ammonia.

The solution of this salt in water (100 grammes of bromide of ammonia to 100 grammes of distilled water) is an excellent preparation for fixing positive proofs. These may be left an hour or half an hour in this bath and then washed in several waters to fix them.

This greatly depends upon the property which the ammonia has of dissolving chloride of silver.

We may also employ this salt for the preparation of negative and positive papers. The formula which has afforded me the best success is this:

Water,	1,000 gr.
Iodide of potassium,	15 "
Bromide of ammonia,	4 "
Sugar of milk,	40 "

CYANIDE OF POTASSIUM.

§ 62. Cyanide of potassium may be prepared by decomposing the double cyanide of potassium and iron by heat, which deprives it of a carburet of iron and which must be separated by solution in water and filtration. The carburet of iron remains in the filter, and the solution evaporated to dryness yields cyanide of potassium, which is the union of hydrocyanic (prussic) acid with potassium. The cyanide of silver which it produces by its union with nitrate of silver, is very sensitive to light, but combined with the iodide and fluoride of potassium, it forms a salt much more sensitive. I would here remark that oxygen does not alike enter into the composition of hydrocyanic acid, but rather hydrogen, the action of which is to reduce still more the oxide of silver. This cyanide of silver is insoluble in water, and in dilute nitric acid. It is decomposed by hydrochloric acid and changed into chloride of silver. Liquid ammonia dissolves it, as do also the alkaline cyandines, and especially the hyposulphite of soda.

Cyanide of potassium dissolves the iodide, chloride and bromide of silver, as well as almost all the other salts of this metal when it is added in excess.

It dissolves also the protoxides and suboxides of this metal precipitated of a black color by gallic acid. Moreover, its solution slightly concentrated is excellent

for removing, with the aid of a camel's hair pencil, the black spots which might otherwise spoil the proofs. Be careful, however, to promptly arrest its effects as it might soon efface the proof more than you would desire. For this purpose, you must quickly soak the proof in water, then in a bath acidulated with hydrochloric acid, which decomposes the cyanide, and afterwards wash it in several waters.

The double cyanide of potassium and iron may also serve for the same purposes. This salt united to ammonical citrate of iron, develops an image by a simple washing with water.

We also employ the cyanide of potassium to remove spots of nitrate of silver from the skin. It is necessary to be very cautious in use, and avoid it if there be any cuts or excoriations upon the fingers, this product being a very energetic poison.

§ 63. Cyanide of Iodine is prepared by mixing together two parts of dry mercury and one part of dry iodine, by means of trituration upon porphyry. The mixture is put into a large necked retort furnished with a bent tube which dips into an *eprouvette*, closed by a cork, through which passes the end of the tube. A gentle heat is then applied until the cyanide of mercury begins to decompose. The disappearance of violet vapors of iodine, and the sublimation of the white cyanide of iodine, are evidences of this decomposition. Heat is continued with much more moderation; white vapors rapidly escape from the retort, and are condensed in the bent tube and *eprouvette* under the form of very light flaccali. The operation finished, the cyanide of iodine is received in a bottle which is supplied with a close fitting stopple. Care must be taken, that this operation be carried on beneath a chimney having a good draft, the vapors disengaged being very deliterious.

I have employed with the greatest success the cyanide of iodine to give the first preparation to negative paper. Nearly 5 grammes to the litre of spirits of wine or distilled water, (already containing 10 gr. of iodide of potassium) are necessary. I leave the paper a few minutes in this solution; then when dry—at the time of making the proof—I lay it for a minute upon the aceto-nitrate of silver, described

at § 11. The remainder of the operation is effected as in the first method.

I obtain thus a great rapidity; however, I have not yet adopted this process, because I have not completed its examination, and hope to perfect it to such a degree as to produce results far superior to those we at present possess.

FLUORIDE OF POTASSIUM.

§ 64. Fluoride of potassium may be obtained by saturating hydrofluoric acid with potash, and then evaporating the solution in a silver capsule; afterwards calcining to redness, for the purpose of freeing it from an excess of acid.

Fluoride of potassium gives great sensibility in conjunction with papers prepared with the iodide.

I should be strongly inclined to believe that this sensibility is owing to the repulsive force which exists between oxygen and fluorine gas, since we have not yet succeeded in combining them.

This repulsion of fluorine for oxygen is further proved by the liquid fluoride of silver, which produces in the preparation of paper, a black precipitate with gallic acid, before even being exposed to the light. By the conjunction of fluorine alone, therefore, the oxide of silver had been deprived of its oxygen.

§ 65. Fluoride of silver is obtained by dissolving carbonate of silver in hydrofluoric acid. Carbonic acid is disengaged with effervescence and liquid fluoride of silver remains.

This product, as yet but little studied, may serve for making negative proofs. The re-agents for developing the image are nitrate of silver, chloride of gold, and the protosulphite of iron.

FLUORIDE OF AMMONIA.

§ 66. To obtain this salt pure, mix together one part of muriate, in powder, with two parts of fluoride of sodium; put the whole in a silver crucible, the cover of which is arranged in such a manner as to contain in its upper part cold water which is to be occasionally renewed. Then heat it, and the two salts are decomposed. Fluoride of ammonia sublimes in prismatic crystals underneath the cold cover of the crucible and chloride of sodium remains in the crucible.

Fluoride of ammonia combined with iodide of potassium gives a great acceleration, due to the reducible action of the hydrogen, which abundantly enters into its composition, and to that of fluorine, as was explained at § 64.

Yet, although it gives greater celerity, I prefer the fluoride of potassium, this last having more stability.

If you wish to obtain some constancy in the results, you must not operate with this body except by combination in the nascent state.

HYDROCHLORIC ACID.

§ 67. This acid is prepared extensively in the manufactories by decomposing marine salt with sulphuric acid.

Muriatic acid diluted with water (20 grammes to the litre) is used for imparting to proofs a very intense dark tint and very brilliant yellow tints, by soaking the proofs after a preliminary sojourn in hyposulphite of soda and then washing with water. This bath effects the disengagement of sulphurous acid which combines with the oxide of silver to form a sulphite of silver.

I described this method a year ago in a preceding pamphlet, and the result is absolutely the same as that of nitric acid, lately described by M. Aubre. By the first method, as by the second, there was disengagement of sulphurous acid and formation of sulphite of silver.

This acid is also used to form with nitric acid the *aqua regia* by the acid of which I compose a solution of gold, of which I shall describe the composition and use at § 72.

CHLORIDE OF SODIUM.

§ 68. Chloride of sodium is found in great quantity in sea water, for which reason it has received the name of marine salt. We can obtain it extremely pure by saturating hydrochloric acid with carbonate of soda. We evaporate, and then let it crystalize by cooling. The salt thus obtained is far preferable to the common culinary salt, which attracts moisture from the air, owing to the presence of chloride of magnesia. It contains also the sulphates which have a hurtful influence.

It serves principally in photography for preparing upon the paper a coating of chloride of silver, upon which the positive proofs are made.

This coating of chloride of silver darkens rapidly in the light, and is more sensitive than iodide of silver. However, this chloride, before being exposed to light having probably already set at liberty the suboxide of silver, cannot be employed for negative images, as the reaction of gallic acid entirely darkens it. Without this defect, it would make an excellent negative paper, (in the dry state), for the camera-obscura.

On the other hand, it becomes valuable in obtaining positive proofs without the aid of any reagent to develop the image. The parts struck by the luminous rays pass quickly to the state of suboxide and even to that of the metallic state, if the exposition is too much prolonged. These oxides and the very divisible metallic silver being black, unite all the essential qualities which could be desired, since they dispense with the use of gallic acid in the production of the blacks. It suffices merely to remove the soluble salts, to arrest the effect of light. Mixed in small proportion with the iodide and bromide of potassium, the chloride of sodium produces an excellent preparation for negative paper.

Chloride of silver is insoluble in water and in nitric acid. Hydrochloric acid diluted, and the alkaline chlorides and cyanides, dissolve it quite well. Liquid ammonia, and hyposulphite of soda, dissolve it almost entirely. These substances may therefore all serve to fix the positive image. The hypochlorate of potash may also answer as a fixture.

The coating of chloride of silver may likewise be obtained by combination with hydrochlorate of ammonia, and chloride of strontium, and all the other chlorides generally, with nitrate of silver. The effects are very near the same, and the coating of chloride of silver is equally sensitive.

Nevertheless, if I were to make a choice among them all, I should prefer the hydrochlorate of ammonia, because it attracts less moisture from the air, and, consequently, the prepared paper is preserved for a greater length of time.

HYDROCHLORATE OF AMMONIA.

§ 69. The hydrochlorate or muriate of ammonia of commerce is manufactured by different processes by means of which the animal matters are removed. In labora-

tories this salt is prepared by directly mixing an excess of ammonia with hydrochloric (muriatic) acid. It is then evaporated by a gentle heat and left to crystallize.

This salt is very soluble in alcohol. We can take advantage of this property to prepare the paper first with albumen simply; then the albumen being dry, we place the same side upon a bath of alcohol at 36°, containing five per cent of muriate of ammonia. The alcohol congeals the albumen

and we thus dispense with the necessity of passing over it the hot iron.

This salt attracts much less moisture from the air than the chloride of sodium; and this property renders it much more preferable for the preparation of positive paper.

The chloride of silver which it furnishes with nitrate of silver possesses the same properties as that described at § 68.

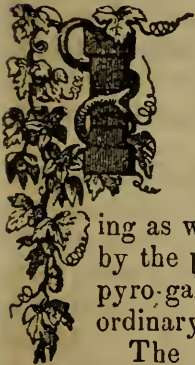
TO BE CONTINUED.

THE COLLODION PROCESS IN PHOTOGRAPHY FOR THE PRODUCTION OF INSTANTANEOUS PROOFS.*

BY ALPHONSE DE BREBISSE.

Translated from the French by Mrs. A. L. Snelling.

EXPOSITION OF THE DARK CAMERA.



CANNOT give very precise indications upon the exposition of the dark camera. This exposition is according to the degree of light, and it varies according as we make the image appear by the protosulphite of iron, by the pyro-gallic acid, or simply by the ordinary gallic acid.

The rapidity of the impression by the light depends upon the lenses which we employ. I have a preference for the object-glasses employed by M. Charles Chevalier. I do not know that they have their superior for effect. The proportion of the diaphragms is well extended. Certainly the German object-glasses are more rapid, but we know well how much their rapidity depends upon their general clearness. Their extent is far from being equal to their diameter, and it is very difficult to make by their means, a portrait of certain dimension without some part of the body being deformed.

Whoever has seen the fine portraits of M. Charles Chevalier, has recognised the perfection of the instruments of this optician.

With good collodion I have obtained proofs of places exposed to the sun, formed upon a whole plate in less than one second.

A portrait in the shadow, with a good light, demands for a whole plate 10 or 20 seconds.

I have obtained upon a half plate in five seconds an equal amount of shade.

Upon a half plate, I have had instantaneously the image of a merchant in a street lightened by the sun. The design was a little light but the arms and legs could be easily distinguished.

These experiments could hardly take place in the beginning of winter. We ought to rely for any effect upon a fine day in summer. The proofs, of which I am about to speak, have been executed in a dark camera.

It is known that the white camera increases the intensity of the luminous impression, but I prefer the black camera which gives a clearer impression.

I have never made a trial greater than

* Continued from page 235, Vol. 4, No. 4.

upon the whole sized plate. I believe it will be equally possible, although the collodion ought to dry more quickly upon a large surface. We can diminish the quantity of ether and augment that of alcohol, which renders the preparation less liable to evaporate. Then we reverse the liquid with less precipitation. The great sensibility of collodion renders it very proper to produce upon glass the curious effects of the multiplier. This instrument as we know, in presenting successively diverse points of a sensible plate behind an opening more or less close, permits us to obtain upon the same proof a great number of portraits of the same person in various positions, or of several persons succeeding each other in different positions.

APPEARANCE OF THE IMAGE.

I know three different means for producing the image.

The first, the most rapid of all, and which allows of a short exposition in the dark camera, is a bath prepared with a solution of protosulphate of iron.

The production with this liquid is instantaneous, but it is unequal and imperfect, if we do not take some precautions.

The protosulphate of iron is preferable in making the solution of which I am about to speak. Notwithstanding, this failing, we can use the ordinary sulphate of iron. As this solution saturated is easily decomposed, we ought to add to it some drops of sulphuric acid, which prevents the liquid from being disturbed and preserves it in a limpid state.

To produce the proof easily after taking it from the dark camera, pour into a basin a sufficient quantity of the sulphate of iron to immerse the plate. Add a twelfth part of crystalizable acetic acid or simply of pyroligneous acid and some drops of a weak solution of silver. Mix well the whole and plunge in the proof quickly. In some seconds the negative image will appear in all its details, if the plate has been exposed a convenient time in the dark camera. If the limits have been passed, the proof will become grey and without effect upon its surface. As the action of the metal bath is produced before fifteen or twenty seconds we shall be able to withdraw the plate, and we shall remark that the details although well indicated, have not perhaps enough of

density. In this case we place the mirror horizontally upon the fingers of the left hand, and we pour upon its surface the following solution :

Distilled water,	100 grains.
Azotate of silver,	4 “

We must take care that the film of the liquid covers the whole of the proof. At about twenty seconds we withdraw the plate and immerse it anew in the metallic bath. This operation enforces the black of the negative proofs ; we must recommence these successive baths if we desire more vigor.

These diverse reactions, in giving more intensity to the black of the negative, produce more effect. The silver reduced in taking the white metallic aspect converts the negative plate into a positive proof, if we examine by reflexion, especially if placed upon a deep black ground. Its negative character is, however, perfectly preserved if we examine by transparency. The finished proof ought to be washed in several waters, and even dipped under a fillet of water as it often happens that it has attached to its surface a granulous deposit which can only be removed by a very rapid current.

The solution of azotate of silver will serve a great number of times by taking care of the filter, from time to time, and by throwing in some crystals of azotate of silver if it becomes poor.

We ought to preserve equally the bath of the protosulphate of iron. To have a bath which has served to make the image appear in a more equal manner than a new bath, it is sufficient to add from time to time a little of new solution saturated with protosulphate of iron with some drops of acetic acid.

I have often used the bath more than ten times without making the image appear or rendering it stronger.

Although I habitually use a solution saturated with protosulphate of iron added to some drops of acetic acid, I ought to observe that I have obtained good results by means of a weak solution of iron with a very small quantity of nitric acid or of sulphuric acid.

There is also a good result from the following solution :—

Rain water,	60 grains.
Protosulphate of iron,	3 decigrams.

Sulphuric acid, 4 drops.
Solution of azotate of silver, 3 grains.

The concentrated bath has no other advantage than being able to serve for a great number of proofs.

When we use the pyrogallic acid to make the image appear, it is necessary to prolong the exposition in the dark camera three times longer than in the preceding case.

We place the glass plate upon a horizontal support, then we pour upon the film of collodion an equal quantity of the following solutions :—

Pyrogallic acid,	1 grain.
Crystalizable acetic acid,	24 “
Distilled water,	180 “

Distilled water,	60 grains.
Azotate of silver,	1 “

The two solutions ought not to be mixed until the moment of spreading them upon the proof for they are promptly decomposed. The image is not long in appearing. It is necessary to agitate the plate from time to time to prevent any deposit from settling upon it. When after some time the proof has acquired sufficient intensity we wash it in water.

The employment of gallic acid demands a more prolonged exposition than pyrogallic acid.

I have never been able to make a picture upon a half-sized plate in less than thirty or forty seconds by the most favorable time when I used a saturated solution of gallic acid to which I added a small quantity of azotate of silver.

The image was slow in appearing, but it was finished with much vigor without requiring an addition of azotate of silver. The proofs produced by means of the gallic acid have much fineness.

M. Laborde has advised lately to add for photography upon paper, a solution of gallic acid with a little camphor. The presence of this substance contributes effectually to the preservation of the negative proofs. I have thought to be able to use it for collodion, but hardly had this solution been poured upon the plate than the sensible film became black.

The same effect is produced much more promptly and with more intensity by a

proof upon which I have poured gallic acid mingled with a solution of acetate of lime. This liquid, which accelerates so quickly the proofs upon paper and upon glass, especially if it is heated, has given an inky tint to the film of collodion upon which I have poured it.

FIXING OF THE NEGATIVE PROOF.

When the negative proof arrives at the right point, and has been washed with care, it is necessary to fix it in such a manner that it will be no longer altered by the luminous rays.

We can be assisted in arriving at this result by a solution of bromine of potassium, like that which has been prescribed by M. Blanquart, for the proofs upon paper. But it seems to me that the use of hyposulphite of soda has an effect more prompt and more certain.

The strength of the hyposulphite of soda in water is of little importance. If we put a solution of a grain of hyposulphite in thirty grains of water, we ought to leave the proof to bathe at least three or four minutes. A solution of one-tenth, that is to say, ten grains of hyposulphite in one hundred grains of water, we shall only need an immersion of one minute. We can only fear sometimes that the half tints may be injured. We ought then to judge of the intensity of the proofs by knowing at what point it can be cast off, and, consequently regulate the degree of action of the hyposulphite solution. We finish by washing the proof anew; it is even good to plunge it some time in the water by taking away completely the hyposulphite of soda. Then we place it vertically so that it can drain and dry.

PRODUCTION OF THE POSITIVE PROOF.

We have used for some time albuminated paper for the production of the positive proofs. This paper gives to the proofs a great fineness and having very agreeable sepia tints. It is very convenient for country views and monuments, but, I believe that the color of its designs and the lustrous aspect are more appropriate to the production of portraits.

I generally prefer the portrait of a dark color and the mat of the positive papers according to the old method of M. Blanquart Everard. All the photographers

know that this paper is first placed in a salt bath for two or three minutes composed thus :

Rain water,	100 gr.
Chloride of soda,	10 "

Then dry with a blotting paper, and when it no longer exhibits touches of humidity, extend the salt side under a solution of azotate of silver (distilled water 30 grains, azotate of silver, 6 grains) or leave it to float about five minutes. This paper preserved and shaded from the light, is extremely sensible, but cannot be kept many days without acquiring a grey tint more or less deep.

There is a paper of which I have proved the good effect, especially for portraits, it has almost the fineness of albuminated paper without having its lustrous aspect. It presents also the advantage of maintaining its first preparation easily and in good light. We can keep it as long as we wish, preserving it by passing it through the bath of silver, when it is necessary.

We prepare the following sizing :

Rain water,	200 grains.
Chloride of soda,	8 "
Tapioca de Groult,	6 "

Two or three grains of tartaric acid or of succinic acid can be added if we wish to have tones more or less bistre.

We can replace advantageously the chloride of soda by the hydrochlorate of ammonia.

We place this mixture upon the fire, when the tapioca is dissolved, we strain the whole through a linen cloth, and by means of a brush, large and flat, we glaze the paper strongly and very white. As the brush leaves some stripes upon the paper, we can make them disappear by swiftly taking off the sized surface with a large pencil.

When the paper is dry, preserve it in a portfolio immediately after submitting it to the bath of silver such as I have described. I had no intention of describing in this pamphlet all the photographic operations which are used in different processes. I repeat, my publication is only suited to those well acquainted with the photographic art. Otherwise, it would occupy a whole volume to tell how many basins, flasks, &c. to give the composition of all the chemical products which more or less

relate to photography. I only repeat what has already been presented to the public.

In the meantime, permit me to recall what has already been submitted to the "Society of Encouragement" with regard to the positive images, there has been for nearly three years a positive frame very proper for this kind of reproduction. This frame which, by means of the elasticity of the spring or of a screw, presses the plate against the positive paper, is provided with a broken plate on hinges, which permits us to follow the luminous impression, in watching a part while the rest is impressed and fixed.

FIXING OF THE POSITIVE PROOF.

I have nothing particular to say about this operation.

I employ for fixing the positive proof, a solution of hyposulphite (water, 100 gr. and hyposulphite of soda, 10 grains.) I immerse my proofs in a close basin filled with a quantity of this liquid, I leave it always at least two hours and even more if I wish to obtain dark proofs. In this case, it is necessary to expose the proof in the sun, time enough, that it may not be too much spoiled by a long bath.

I have made the solution in the basin serve for two or three times. When the hyposulphite is old, it gives a yellow tone to the proofs, which are afterwards often attacked by the deposit of sulphur which has penetrated the paper.

To bring out the hyposulphite, I wash the proofs with water, and leave them to be bathed in a large basin, at least for twelve hours. I stop changing the water, when it has obtained a somewhat sweetish taste like sugar, and often submit it to a last wash in boiling water.

In order to dry the proofs, I dispose them upon blotting paper placed upon an inclined plane.

We give them a remarkable vigorous tone by putting them to the fire to dry them completely. This effect of a lively heat upon the tint of the positive proofs has been proved for several years by M. Guillet Saguer.

People have pretended that the process by means of the collodion, is too costly to become of common use. This reproach is far from being well founded, for the gun cotton and the sulphuric ether, are not

very expensive and the solutions of silver which we use contain less of azotate of silver than any of those which are demanded in the other processes upon paper and glass.

The great sensibility of collodion has been also doubted.

If we wish to make a trial of the different operations of which I have written, employ especially the iodide of iron and the iodide of silver to make the protosulphite of iron appear, and I will not doubt the result.

For a view in the sun on a fine summer day, I can assert, without exaggeration, that a proof, upon collodion prepared thus as I have said, will become difficult, if there is not a mechanical means for opening and shutting easily the obturator of the object-glass.

I am in hopes that I have forgotten nothing which might be useful in the operation of collodion of this photographic process, the knowledge of which has been very little extended, to dare to say I know all that can be drawn from it. The English, who practised it with success since its discovery, ought to be more advanced than we are in its perfection. I do not believe meanwhile that they have obtained preparations as sensible as those which I have found and am happy to make known.

With the intention of omitting nothing of importance with respect to collodion, I shall give in the Appendix translations of what has been published in England upon the subject.

APPENDIX.

By means of collodion, it is very easy to execute by a stereoscope a double image which produces the most marvelous effects.

The stereoscope is an instrument invented by M. Wheatstone, for the purpose of making two images unite in one object, designed to look at it with one eye, then with the other, in such a way that the observer receiving the simultaneous impression of the salient points and of the hollowness of the object, believes he sees it in bold relief.

Some positive stereoscopic designs, of interior views, such as the crystal palace in London, &c. produced upon glass and examined by transparency, give a truly magnificent spectacle.

RULES TO BE FOLLOWED IN THE EMPLOYMENT OF COLLODION PREPARED BY MARCHER FOR OBTAINING INSTANTANEOUS, POSITIVE AND NEGATIVE PROOFS.

Extract from a communication of M. Horne to M. Robert Hunt, and published in the *Art-Journal*, July 1851.—No. 157.

“The collodion, as all the world knows, is a solution of gunpowder in ether, which, for the preparation it requires, contains a small quantity of iodide of silver dissolved in the iodide of potassium. This solution is sufficiently fluid to cool freely upon a glass plate when it is poured upon it. We ought to put in the ether only when it is in a certain condition. If the collodion is too thick, it will prove a great difficulty in obtaining an equal film. But when it is of a convenient consistence it will do with plates of all sizes.

“The method which I have adopted with great success is the following:

“Take a piece of smooth glass of the size of the frame in the dark camera; after having washed and dried it, hold it by one of the angles, or, if it is large, lean it upon some support; pour upon the centre of the plate a sufficient quantity of prepared collodion as will not be tardy in extending itself equally upon its surface. As soon as possible reverse the liquid in one of the bottles by one of the angles, then sink down the hand which holds the elevated plate in such a manner that the liquid cools without being removed from the neck of the flask, the wrinkles which show themselves upon the surface, are opposed by the striates in such a manner that the film becomes smooth and united. A little practice will soon obtain a good result. Then the plate, before the ether is entirely evaporated, is immediately plunged into a bath of nitrate of silver of thirty grains to an ounce of distilled water, until the greasy look which is remarkable at the time of immersion, has disappeared, and the solution of silver flows freely over the surface of the collodion. The plate ought now, being yet moist, to be placed in the dark camera to receive the image. The time of exposition varies naturally with the light, but, for a portrait, and with a lens of moderate quickness, it will require from three to thirty seconds. W. Fry, M. P., who first used the collodion, has

obtained fine portraits by placing his subject in open air, by taking off the cap of the camera, and shutting it as soon as possible.

The agent for developing the image, is the pyro-gallic acid which has been recommended by M. Archer. I have heard said that the protonitrate of iron produces the same effect.

"The solution of pyro-gallic acid ought to be made as follows :

Pyro-gallic acid,	3 grains.
Crystalizable acetic acid,	1 drachm.
Distilled water,	1 ounce.

The plate, after being taken out of the dark camera, ought to be placed for support upon a level surface. We then cover it with a sufficient quantity of the acid solution and the image will not fail being developed.

NEW COMMUNICATION BY M. ARCHER.

Since you have published my short communication upon the use of the bath for the photographic process by means of collodion, I would address to you a certain number of questions upon divers points of manipulation. I am desirous to communicate a method for whitening and blackening the proofs obtained by the collodion, hoping they will be of some interest. I am about at first to describe the means of whitening the proofs, then I shall add a few remarks upon manipulation in general.

The proof being washed in water after having been fixed by the hyposulphite of soda, is treated in the following manner :

Prepare a saturated solution of bichlorate of mercury in muriatic acid. Add a part of this solution to six parts of water and pour a small quantity of this liquid upon a corner of the plate in such a manner as to make it of an equal film. The tones of the proofs immediately take great vigor and the positive image appears almost instantaneous. The proof presents a white appearance of great delicacy.

The negative character of the design is soon destroyed and presents only a positive white proof. This proof, after having been washed and dried, can be varnished and preserved as a positive proof. Nevertheless, notwithstanding this whiteness, the proof can be changed into a negative more vigorous and black, by plunging it after

having washed it, into a solution of hyposulphite of soda. In a little time the white image disappears and it is succeeded by a black negative.

It is very singular that a positive white proof can become alternately, and repeatedly, a black negative proof, taking a tone more and more intense. By this proceeding we can obtain a perfectly white image and a black image, proofs perfect, and each distinct from the other.

What I would particularly recommend in the manipulation of this process, is an extreme clearness. If we neglect this essential point, it is impossible to obtain a good result. A linen well dried, is very convenient for cleaning the mirrors to give them the last polish. It is very necessary to see that the linen we use has not touched the hyposulphite, for this substance forms with silver, a combination very difficult to remove either from the linen or the glass. I recommend strongly that the mirror of which we make use be longer than necessarily required, by an inch, to make a place for the fingers to hold upon during the operation. The striated deposition which the collodion takes in drying can be avoided in balancing in drying the glass held vertically, and having care that the inferior angle remains in the neck.

The solution of silver ought to be filtered with this precaution, we can dispense with taking it in a shade from the light. It is not necessary to add the iodide of silver, when it contains thirty grains of azotate of silver to an ounce of water.

When the film of the collodion is extended upon the glass, we leave it in the air to dry some seconds before we put it into the bath of silver.

We augment the energy of the pyro-gallic acid by adding to it a small quantity of protosulphate of iron.

We can fix the image with a solution of iodide of potassium which elevates the iodide of silver not decomposed, or with a solution of chloride of sodium.

I could have desired to give to this process a name which would indicate the particular changes of which I have spoken.

M. Talbot in describing his new process employs the word "Amphitype" to describe the nature of the images ; but a word which can be translated "Ambigu"

cannot apply to the proofs made by the collodion, for it is impossible to be mistaken about the character of these positive and negative designs. The third kind of images which M. Talbot mentions can be obtained with the collodion, if the operation is limited to a proper time.

To obtain the changes I have mentioned by collodion, it is necessary that it be in the best condition, especially when we ope-

rate in open air. This process is inestimable, if we wish to obtain rapid views of nature. With the dark camera which I have appropriated to this use, one can, without assistance in one day, produce one or two dozen views with only one or two pieces of glass.

FREDERICK SCOTT ARCHER.

TO BE CONTINUED.

THE HILLOTYPÉ.



THE following communication from the St. Louis Republican has been sent to us by the author for publication. We give place to it with pleasure, as we ever shall to the testimony of all respectable men on all subjects connected with the photographic art. There are many things in this article objectionable, but the first decidedly so, is an evident endeavor to put forward a portion of our daguerreotypists as rightful claimants to the benefit of the discovery to the exclusion of others. In republishing the article we take the liberty of omitting the long list of names therein mentioned, because we shall not lend ourselves to a course well calculated to injure others, not mentioned, who are equally entitled in every respect to Mr. Hill's consideration, who, as a man professing piety, is bound to consider, for he is pledged by solemn assurance publicly given to be strictly impartial in the distribution of the rights to use his discovery.

We will here take occasion to say, that we have recently heard statements that leads us to hope that Mr. Hill may yet overcome all his difficulties. Some who have lately seen his pictures give positive assurance of a very speedy termination to his labors; while others seem still doubtful, and there is so much clashing of opinion

among those who have seen them, that it must not be expected that those who have not, can form a just decision at present. However, we think our daguerreotypists may look for some kind of statement soon to be made that will fully settle the question, and we must sincerely wish that it may be favorable to Mr. Hill. We have written repeatedly in regard to this matter, as time and circumstances enabled us, giving such *views* as the evidence before us led us to form. Much of what we have said has been verified, but we shall be as ready to rejoice as the most sanguine if our fears are not. In the event of a successful termination to his labors, Mr. Hill will be the more worthy of the gratitude of his fellow-artists, and more worthy the renown he will acquire, and it will be his duty—as we doubt not it will be his inclination—to render strict justice to all. For ourselves, we have nothing to ask of Mr. Hill, we are mutually under no obligation, we never can, personally, be benefited by his discovery, but we never have written or said a word in regard to it, that we did not consider in perfect accordance with the facts placed before us, and the same spirit shall always prompt us in future. We are perfectly independent in the matter and intend to remain so. Mr. Hill has always had our best wishes for his success, and always will have, but this will not prevent our speaking as our convictions prompt.

NEW YORK, Aug. 9th, 1852.

TO ALFRED S. WAUGH, Esq.—Dear Sir:—One year ago I gave you a written account of my first visit to the mountain home of Mr. Hill, the discoverer of the photographic process of taking landscapes in all the colors of nature, and freely expressed my belief in the man and his discovery with the conclusions which I drew from that visit and all that I witnessed there. Since then there has been a strong current running against him, set in motion, I am sorry to say, by some who claim to be members of the daguerrean fraternity. But no matter, their envy will avail naught, for you and the public will soon be able to judge of his merits and give to him his just dues when the facts are fully made known.

Passing over that wild, romantic portion of the country in full view of the Catskill mountains—those mountains rendered famous by the genius of Washington Irving, as the scenes of the adventures of Rip Van Winkle—I found myself descending into that peaceful valley where lies the sweet little village of Westkill and making my way to the residence of Mr. Hill. I found that indefatigable man in his laboratory assiduously prosecuting his experiments on his new process, in order to perfect his plans previous to laying them before the scientific world. But I was sorry to see that he was paying a heavy penalty for his labors, as his health was very much impaired by close attention to the idol of his heart. Yet notwithstanding all this, *that* heart is still the same, and the amiability of his disposition remains unchanged. During my sojourn he informed me that he had made a great many improvements on his process, and was enabled to bring out the colors more distinctly and brilliant than heretofore, and with a greater certainty of success. The world, or rather a great number of Daguerrean Artists, have done Mr. Hill a very great injustice by pronouncing him a humbug and imposter; and some went so far as to threaten not only a public exposure, but personal injury. Now, the question arises, why this persecution of an honest, upright and innocent man, when the party so abusing him could not have personal malice toward him? I will tell you: it is simply a feeling of jealousy be-

cause he did not take them into his confidence: or what is more likely, because they had not brains enough to fathom the mystery which surrounded the operation. They did not believe that mortal man could produce anything beyond their own limited comprehension. But I am rejoiced to find that in the hour of his adversity he was not forsaken, for many of the leading stars in the firmament of genius smiled kindly on his efforts.

At my first visit to Mr. Hill's this time twelvemonth, I had not the pleasure of seeing any specimens of his pictures as up to that time very few—and those only who were the most intimate friends—were favored with a sight under the seal of secrecy; for he did not wish them to be spoken of until he was ready to lay them before the public at large. But his enemies were determined to forestall public opinion, and crush him ere he had time to acquire strength. In this, however, they failed most signally, and now many of them are beginning to feel ashamed of the contemptible part which they have played.

I suppose you would feel inclined to ask me if I have seen any of his specimens and what I think of them, and I am as readily inclined to answer. I have, and must say that I was disappointed—yes, very much disappointed, for their brilliancy and perfection surpassed all my expectations. I always believed, from the first announcement by Mr. Hill, that he had discovered a process by which he could transfer the colors of nature to the metallic plate, but had no idea that he could do so with so much perfection. The eye cannot see, the tongue express, the mind conceive, or the pen describe, the perfection of those pictures. In a word, they are perfect transcripts of nature, and far surpass every preconceived opinion I had formed of them.

Owing to the frequent interruptions of visitors, Mr. Hill is obliged to adopt very strict rules in order that he may be able to prosecute his labors in a connected manner, and now his most intimate and best friends could not get an interview with him except before 9 o'clock in the morning and after 6 in the evening. I have been more fortunate—for I have not only seen him during his hours of study, but about thirty of his pictures, some of them on the double whole-sized plate, whole-size, half-

size, quarter-size, and medium, taken from highly colored engravings, and from life. So very firmly are the pictures impressed on the plates that you cannot injure them by friction as in the ordinary daguerreotype. Mr. Hill allowed me a privilege very few enjoyed—that of handling them freely. I rubbed several of them with my finger and handkerchief, but without producing the slightest ill effect, on the contrary the more I rubbed the brighter they appeared.

Before I close this letter allow me to describe a few which particularly struck my attention. One double whole sized plate taken from a highly colored lithographic print of a lady and child. In this picture there were the following colors:—Bright red, pink, dark blue, light blue, and orange, with their several combinations and tints. This was a lovely picture. On the other, a basket of fruit containing peaches, black and white grapes, with beautiful bright green and darkly tinted leaves. This picture, like the other, bore every resemblance to nature herself. The colors of the first were the most perfect; also a yellow basket filled with fruit of various kinds. On other pictures different varieties of flowers of the richest coloring and their tints. In this there was a charming effect produced by a sprinkling of small yellow and blue flowers. Several plates of the large size with birds of the most gorgeous plumage. On one were five birds with heads, tails, bills, breast, wings and claws of different colors, all true to nature. But above all, was a lovely picture of his own child, with her flaxen hair, light blue eyes, delicate flesh tint in the face, arms and neck, and a charming child like expression of countenance. She was dressed in colored clothes, with red stockings and blue gaiters. This was a pretty little picture on a quarter-sized plate. Another of a sweet looking young lady of the village, dressed in blue. The beauty of the complexion in this picture, would make miniature paint on ivory sigh for its departed greatness. Many more I could enumerate, but this is sufficient for the present. I am in hopes Mr. Hill will be able to exhibit before the world this fall, when I have no doubt a complete revolution will take

place in the daguerrean process that we have little dreamed of.

Most respectfully yours,

J. H. FITZGIBBON.

Since the above was in type, we have received the following statement and communication.

In our last we mentioned that a meeting of the daguerreotypists of New York city had been held and a proposition made by them to Mr. Hill for the purchase of his alleged discovery. It will be seen by the following that our information was correct, as well as our surmise that their efforts to bring Mr. Hill to terms had failed.

The plan herein laid down, for the purchase of the "Hillotype" by the Daguerreotypists of the United States and submitted to Mr. Hill together with his reply was handed to us by Mr. Beckers, one of the committee appointed at the meeting alluded to. We publish them, commending them to the serious attention of our readers, deferring all comments until they have had sufficient time to digest them, and in hopes that we shall receive the views of some as to the course that should now be pursued in regard to the matter.

The Plan Proposed by the New York Daguerreotypists to Mr. Hill for the Introduction of his Discovery.

"Mr. Hill to advertise for 1000 subscribers or more at \$100 each to purchase his process under the following conditions.

"1st. One month after the required number of subscribers shall have been obtained, each subscriber shall deposite \$100 in a bank and forward a certified check of that amount to a committee, this committee to be appointed in part by the said subscribers and in part by Mr. Hill.

"2nd. Mr. Hill to apply for a patent and shortly after to show to the committee the manner of taking the colors of nature on a daguerreotype plate by the camera. The committee being convinced of such discovery to pay over to Mr. Hill the amount of money deposited for him, (say \$100,000 or more,) without any delay or objection—said sum or sums to be paid for the process

perfect or imperfect, good bad or indifferent.

"3rd. That the \$100 paid be considered only as a right for the individual use of the process.

"4th. That each subscriber renounce the right of taking out patents for any improvement in the process, and bind himself to communicate his improvements to the patentee, for the mutual benefit of the subscribers.

"5th. That a certain time should be fixed by the committee before the process should be made public, in order that the subscribers might perfect themselves in the practice of it.

"6th. That the patentees only buy the right for the United States."

The above is a short statement of the propositions made by the committee to Mr. Hill; beside this it was suggested that a sinking fund might be made in the following manner to protect Mr. Hill's rights from infringements. That all subscribers not included in the first list of shareholders should pay an advanced price for each right, of which sum one half should be paid to Mr. Hill and the other half should form the above fund, any surplus arising should be used for the improvement of the process, or to be divided among the original shareholders.

WESTKILL, GREENE Co., New-York.

November, 10, 1852.

Messrs. Beckers, Weston and Gurney:—
Gentlemen,

I owe you an apology for my delay in replying to your proposition, made on behalf of a respectable number of the Daguerreotypists of the city of New York. Ill health, absence from home, and, since my

return, the demands of business, must be my excuse.

Your proposition, coming as it did from so respectable a body, and dictated as it evidently was in the kindest spirit, I have given my best thoughts. At the time of my interview with you my mind was pretty much fixed upon the course I should pursue. This was, substantially, a perseverance in my original plan—a plan in the propriety and utility of which I always had full confidence. Yet, I felt bound to listen to your views and suggestions, for in some aspect, particularly in relation to the state of my health, I could but regard them favorably.

My health is now in a good degree restored, and I have again commenced my labors, my prospects being such that I do not think it would be wise for me to deviate in the least from the course I long since marked out for myself. I feel confident that I have accomplished the hardest part of my task, and I am more anxious to carry the discovery to the goal, with my own hands, than I am for the pecuniary gains I could even now secure, in many ways. Allow me to say that I doubt whether one of your number could be found who could be prevailed upon to pursue a different course, were he in my circumstances, and had he passed through just what I have.

Could I see before me any insuperable barriers to my complete success, I would most gladly accept the aid of your helping hands. In a journey through an unexplored wilderness, company is agreeable and delightful; but, unless I am greatly "deluded," I can see the land I have been seeking for; and the least I can now do is to promise, if a kind Providence prospers me, to join you in that delectable place, at a future day.

With great respect and consideration, I remain, Gentlemen, Yours truly,

L. L. HILL.

NOTE, UPON THE PROCESS OF FIXATION BY MM. PHOL AND OULIF.



ALL science, all art, is, at its commencement enveloped in mysteries. It is only by slow degrees that the human mind proceeding by analysis from one deduction to another manages to conquer the difficulties which envelopes as with swaddling clothes its flight. He can no longer reduce to simple and fundamental laws, the divers phenomena which obscure the way and prevent him from arriving at the truth.

These philosophic ideas find a new and immediate application to science, which this Journal intends to propagate. I wish to speak of photography.

This science is still in its infancy, and in the meantime, we know only the name of its discoverers, we forget those who are every day endeavoring to aid in its progress. In the midst of incessant efforts we ought to be impressed with the truth that identical results proceed from different causes.

I say different in appearance, because it is only with the spirit of investigation which alone agrees with the exact sciences that we can discover and demonstrate their common origin.

To be clear, it is necessary to cite some examples and among thousands which I might choose, I select two from this Journal, of the 18th and 25th of September. One of these articles is entitled "*Employment of the Sulphate of Ammonia*" and the other "*Fixing bath of Metz*."

M. Pohl indicates as an excellent fixative of the photographic images upon paper, the use of ammonia; he says and insists upon the fact, that the brown or red proofs become perfectly black by this reaction. It is simple and natural and clearly shows where the merit is, I will not say of the invention, but of the receipt of M. Pohl. Who does not know, in short, that whenever a salt, an oxide or any metallic substance whatever, finds itself in contact with sulphuretted hydrogen, and moreover with sulphate of ammonia, there is a production of a metallic substance general-

ly black. Each of us has proved this phenomenon in the ordinary circumstances of life. In eating eggs for example, the silver spoon becomes black because the eggs contain sulphur. In a house where the facilities for draining off foul substances are not complete, the oil pictures, the household utensils, whether of copper or silver, are covered with a black coating, owing to the decomposition of the sulphuret of ammonia, which is volatilized upon the metallic substances in question.

Not only do I not criticise, but I admit the means indicated by M. Pohl. Only I would observe that I do not comprehend the passage where he says that he uses the sulphuret of ammonia, as a fixative and as a means of obtaining a change in the coloration of photographic images is incompatible with the presence of chloride of silver. In effect, when we submit chloride of silver to the action of sulphate of ammonia, there is a double decomposition and immediate formation of sulphate of silver and of chloride of ammonia. This experiment which I have repeated several times in my laboratory, completely annuls the assertion in the account rendered by the meeting of the Academy of Sciences at Vienna. It remains only to say that if we wish to obtain clear photographic proofs, we must use the *sulphur*.

But few persons are acquainted with the sulphate of ammonia. Its employment, besides, is subject to a crowd of inconveniences, and to particularize one, it is capable by its foetid odor of driving from the stand every one who takes an interest in watching its effects.

M. Casimir Oulif seems to have foreseen these imaginary difficulties; at all events, the receipt he has given has certainly conquered them. What is it in effect! by pouring some white vinegar into a solution of hyposulphite of soda and plunging in the image to fix it. What happened in this operation? The acetic acid of the vinegar decomposes the hyposulphurous acid of the hyposulphite of soda into sulphurous acid which disengages itself, and sulphur is deposited. This sulphur so separated appears in the liquid under the form of a white

cloud. Now, in this state of separation, that is to say, in a nascent condition, the sulphur is apt to combine directly with the metallic substances. It transforms then, at the same time, the salts of silver contained in the proof into sulphuret of silver. Here is where M. Pohl is surpassed by M. Oulif; both, by employing agents in appearance so different, arrive at the same result. They fix the proofs upon paper by combining sulphur with the salts of silver they employ.

The experiments I have given do not leave any doubt upon the facts advanced by these gentlemen and upon the justness of the theory that apply to them. If we dissolve some chloride of silver in hyposulphite of soda, and pour upon it some acetic acid, and for a stronger reason some mineral acid, such as sulphuric hydrochloric, &c, the liquor is agitated, becomes white and opaque, absolutely as if it did not contain silver. By degrees it deepens in color and becomes red, maroon, and brown. These tints are owing to a deposit of sulphate of silver very divisible, which at once unites and forms a true black precipitate. The iodide of silver in solution in the hyposulphite of soda, treated in the

same manner gives the same results, although more slowly. Thus, then, the bath, *fixateur de Metz* fixes also in sulphur. It has not, like that of M. Pohl, its disagreeable inconvenience, but as its action is not always as prompt as the operator would desire, I make the effect more rapid by adding some grammes of the sulphuret of potassium and of the sulphuret of soda prepared,

To the bath of Metz as follows:

Fountain water, ...50 grammes.

Hyposulphite of soda, ...5 “

Common vinegar, ...50 “

I add

Sulphuret of potassium, ...2 grammes.

I agitate, and cover with a glass plate. It disengages itself by sulphureted hydrogen, and the liquor is found charged with sulphur, in such a manner that the action of this body upon these salts of silver is more immediate and more intense. When the proof is fixed, well washed and dried, we can render it very white and much less alterable by passing it into a solution of bisulphuret of carbon. This dissolves out all the sulphur contained in the paper.

LEON KRAFFT.

From the *Scientific Daguerrean*.
PICTURE MAKING.—No. I.

BY D. D. T. DAVIE, PHOT.



WHEN in possession of a suitable plate, the first step toward producing a good daguerreotype is scouring, or as commonly called, cleaning the plate.

This step, in itself of primary importance, should be carefully taken. The master-builder always looks well to his foundation, and as the results of the daguerrean depend essentially upon this first step, too much attention cannot be bestowed upon it.—Want of attention to this must

occasion great loss of time and stock, and always subject us to uncertainties in results, by which we may expect loss of custom also. I admit that this negligent class of artists occasionally obtain an excellent impression, which may however be regarded as a misfortune, since by an occasional fortunate strike they are encouraged to go on in their old course, charging their numerous failures to all other causes except the right one.

To clean a plate well, requires a certain degree of mechanical tact and native skill, not even possessed by every artist even yet,

a process so simple, and withal so delicate may, we are confident, be reached by all. At the same time we doubt whether but a small proportion have as yet attained the point of excellence in it.

What, let us enquire, are the specific objects to be attained by cleaning a plate? A smooth, level surface, all agree. Yet this is not all; it should be free from all furrows and fine scratches, for as the light from the object falls upon the surface, to have the greatest chemical effect, it should strike every point perpendicularly; whereas if the surface is left full of scratches and grooves, though they may be extremely minute, they are like hills and valleys, compared to the diameter of a beam of light, so that a large portion of light will after all strike the surface at an angle. Beside, the chemical coating will be unequally distributed, and thus give a mixed tone or blurry appearance to the picture. The solution used should be of a material capable of dissolving from the surface all oily and gelatinous matter, such as perspiration from the hand, and every thing which oils the surface of the pure metal.

In preparing the plate for cleaning, it should be carefully and uniformly clipped and crimped and securely deposited in a box with a tight fitting cover. All this, though it may not materially affect the character of the picture, will affect the habits of the operator, and go very far towards rendering him a neat, careful, and successful performer, or otherwise.

Great care should be taken that the plate is not warped during any of the processes, for by this a portion of the plate will be brought out of the focus, and a poor impression is the result. Where no machine for crimping is in the possession of an operator, plates should be ordered ready crimped.

Before the plate is scoured, it should be held over a spirit lamp till hissing hot, as spots are often found on the surface which will not yield to scouring, but which are easily driven off by heat, and a pure surface obtained.

The plate for scouring should be placed on a flat block, a little shorter than the plate, and beveled all around to correspond with the crimping of the plate, and firmly secured by the claws or knives of the block.

The best combination which has come

to our knowledge for cleaning, is good alcohol 2 parts, and ammonia 1 part. This with well prepared rotten-stone, is sufficient to prepare the plate for the buff. When the plate is scoured by hand, small patches of cotton flannel or velvet are used, 1-4 inch square. Not less than four should always be at hand. No. 1 is used to scour with. First dust on to the plate a little rotten-stone, place the patch upon it and pour upon the patch sufficient of the alcoholic solution, (not too much); scour with a circular motion and gentle pressure uniformly over the entire surface, and towards the last of the operation gradually lighten and at last give only a delicate touch and gentle motion till by a certain sense you feel that the patch moves over a delicately polished surface. Then with patch No. 2 wipe the cleaning from the edge of the plate, and after the plate has dried, with No. 3 carefully remove the stone from the surface, at the same time blowing it away till none is visible on the plate, then with No. 4 complete the operation of scouring by first ejecting over the surface of the plate the moisture condensed from the breath, (taking care that no particles of saliva fall upon it, which is mucilaginous, and will destroy the finish. If any should fly upon it a little alcoholic solution will remove it.) Now dry the plate off with the greatest care. No part of the process is of greater importance: even the movement and pressure will change the tone of the picture. This, like every other step, is more easily understood than described: yet an artistic eye will readily detect all the delicate shades in pictures, and easily point out the influences which produced them.

In relation to a proper solution for cleaning, I have tried a good many experiments, each of which have been significant. All other circumstances and materials being the same, three plates were cleaned, respectively with alcohol and ammonia, clear alcohol and pure water,—the first pleased me much the best. The portrait was, comparatively speaking, round as an apple, and clear and beautiful as life. The lights and shades were beautifully blended and defined, giving a fine perspective, and the tone rich, mellow, and agreeable. On the plate cleaned with clear alcohol a far inferior impression was obtained, lacking in all

the prints which rendered the first so perfect; while the one cleaned with water gave an impression, yet so flat and cold, and destitute of character, that the senses were chilled by looking at it.—All these results depended upon the condition in which the plate was left, in one instance clean. In the other veiled by a mucilaginous coat from the perspiration of the hand, which the alcohol failed to dissolve, and lastly, the plate was covered with both oil and mucilage not dissolved by the water.

There can be no doubt but the solvent power of alcohol upon oils, and that of ammonia upon mucilaginous substances, renders a combination of the two, a compound better adapted to cleaning than any other known substance.

In passing the fashionable streets of any of our cities, you will see as many kinds of pictures exhibited as there are Galleries. I speak with reference to the color or tone

of the pictures. Some are very fine, others not so fine. Those groups of pictures, always remind me of a caricature, by a miserable daub, I once saw suspended beside one of Raphael's masterpieces. On Broadway, New York, are to be seen some of the most hideous and ghastly caricatures that ever haunted human beings, of all colors and form that language can describe. Some appear as though the likeness had been baked on and after the manner of japanning, others looked as though the concentrated light and heat had burned them to some depth below the surface of the plate, while others had the appearance of having been chased into a premature existence by a densely black thunder cloud,—all are *sui generis*.

Now, why, I ask, this discrepancy? It is not so in other departments of the Fine Arts, and should not be with us. Brother artists, let's try.

PHOTOGRAPHY.

From Cosmos.



THE last number of that magnificent Review, the "Art-Journal," contains a long article from Mr. Hunt upon the collodion of M. Archer, and the gutta percha of M. Fry. We shall make extracts from everything essential contained in it.

That the film of collodion and of iodide of silver are incomparably more sensible to the photogenic rays is a certain fact, as Mr. Hunt asserts, and he tries to explain it by a particular application of the gun cotton, which is impressionable at the time, and by the chemical and calorific rays. The addition of the gutta-percha increases still more the sensibility of the film. It is a little doubtful, but it certainly gives more tenacity and thus takes better in the shade.

The protosulphate of iron appears to Mr. Hunt the best of all agents proper to con-

tinue the work of the light in developing the image, by finishing the deoxidation commenced by the salts of silver, and making the metal revive in a state of extreme divisibility. The protonitrate of iron is also strongly recommended, and it is thus prepared. Put into a glass vase some pieces of protosulphate of iron, and pour upon it a solution of nitric acid, formed by one part of acid and three parts of water. The protosulphate is decomposed, the sulphuric acid is disengaged, and as it is very dangerous, the operation ought to be made in the open air. After the decomposition of the protosulphate, what remains in the vase is protonitrate of mercury dissolved. Decant it, filter it, and in order to clear away the great quantity of sulphuretted hydrogen which it still contains, expose it for some hours to the air in a very flat glass. We actually use it as the protosulphate of glass, and it acts as perfectly upon the glass, as collodion or albumen upon the

sensible paper. A second mode of preparation consists in a solution of ordinary sulphate of iron acting upon the nitrate of baryta: The product of the double decomposition is protonitrate of iron pure, if these salts are mixed in proportion with their equivalents.

The action of bichlorate of silver or of corrosive sublimate proposed and applied with so much success by Mr. Archer, is truly remarkable. Its first effect is to blacken the parts already dark, of deepening it considerably, and, consequently, adding to the intensity of the image. If when this effect is at the maximum we take away the image, we shall see it effaced and gradually disappear, but only to show a gradual and new transformation; we may say a magical effect. All the black parts have become white, covered over as they are with a very white precipitate. The premature negative image is then transformed into a positive image, and if we place it upon a black velvet or upon a paper coated with black varnish, it will produce the effect of a very beautiful painting by the very striking contrast of blacks and whites. How explain this singular metamorphosis? Probably, said Mr. Hunt, the reaction of bichlorate of mercury and of salts of silver, produces by turns both the black subchlorate of mercury, and the white chlorate or insoluble calomel.

Mr. Hunt mentions as incomparably beautiful, as surpassing everything that he has seen of this kind, the proofs upon collodion, obtained by Doctor Diamond.

It brings to mind that the employment of potash, as a fixing agent as proposed by Mr. Malone, ensures proofs of a greater duration than the feeble solution of chloride of gold, proposed by M. le Gray, because the salts of gold have the inconvenience of changing in tint from year to year, and of communicating to designs upon paper a disagreeable shade of violet.

Since it is certain that gutta percha has some real advantages, we should like to give more in detail the process of Mr. Fry.

To dissolve the gutta percha, put small bits of this substance into sulphuric ether, and leave them there three or four days; add a third of the solution thus obtained to the collodion iodised. When the mixture becomes very clear, spread it on a glass

plate, as we should do with pure collodion; and when this has been well done, we lay the plate into a bath of nitrate of silver containing one gramme and 85 centigrammes of salt for 28 grammes of water and leave it there a minute. If we would obtain a proof or negative stereotype, we should immediately place it in the dark camera plate taken out of the bath without drying it.

If, on the contrary, we would obtain a positive proof, we should sponge it with the finest possible blotting paper. When the excess of dampness has been taken away the film becomes firm, and we can place over it the negative proof, whether of glass or of waxed paper, at the end of one or of two seconds, if we can operate in the light of a very brilliant gas burner, the image is formed; we pour upon the surface pure water to favor the action of the salts which should develop it. The following preparation gives admirable images of great force and beauty. Mix together eighteen decigrammes of saturated solution of sulphate of iron, eighteen decigrammes of distilled water, ten drops of the solution of nitrate of silver, containing nineteen decigrammes of salt for thirty-one grammes of water, ten drops at least of acetic acid.

If the development of the image was too slow, we should abandon the solution of sulphate of iron and replace it by the bichlorate of mercury dissolved in four times its weight of water. As soon as we can make this solution run upon a glass plate, we wash it and finish it by holding it plunged during a certain time in a solution saturated with hyposulphite of soda.

In the May number of the *Art-Journal*, a very well exercised photographer, but who keeps anonymous, recounts the anxieties and disappointments which troubled his first attempts with the collodion. His images being almost always covered with black spots, diffused, but very visible. He employed, however, only excellent collodion prepared by M. M. Horne, Thornwaite and Wood. Desperate, he determined to prepare the collodion himself. The black spots still occasionally showed themselves. After a thousand checks, he observed at last that the collodion contained a too large proportion of iodide of silver; he reduced it, and afterwards obtained proofs perfectly

neat and beautiful without fail. According to him the best of all preparations for obtaining positive proofs is a solution of protosulphate of iron in the proportion of twenty-five decigrammes of salt for thirty-one grammes of water, sharpened by some drops of sulphuric acid; the lights have then a clearness that we can obtain by no other process. In an article of the Art-Journal in which they speak of the raised piece of photographic apparatus, M. D. T. mentions the cost of his photographic tools. He bought of Knight & Son for £1 3s. (nearly 28 francs) a simple achromatic lens of two inches and a half aperture, eight inches focal distance. He had made for five shillings (less than six francs) a camera-obscura, eighteen inches long, six inches high and wide, provided with slides, &c. At this expense he dares to say without pride, that all the photographic proofs, landscapes, monuments, portraits, copies of engravings and pictures, &c., taken with his modest apparatus, can rival everything he has seen of the most beautiful in the richest shops of London or in the collections of amateurs. His object-glass which he would not change for the most vaunted German object-glasses, made everything succeed, albumen, collodion, collodion mingled with gutta-percha, &c.

Photography upon paper at Rome is surrounded by a thousand difficulties, and the preparations which succeeded perfectly in England and in France give there only bad proofs *always solarized*. However small may be the dose of nitrate or chloride of silver, the paper is always too sensible. The sky is so pure, the light so brilliant and active, that it is impossible to obtain a passable negative stereotype, the chemical action, too oval at the surface, does not penetrate the paper. Happy to save his brethren in photography his ennui and despair, M. Richard W. Thomas describes with the greatest details in the May number of the Art-Journal the only method to ensure success. His description is too extended to be reproduced to-day; besides, it would interest only a small number of our readers.

The photographers at Rome are numerous, ardent and skillful. The masters of the art are the Prince Giron des Anglonnes, M. M. Robinson, Canova, Constane and

Flackeron; they meet every evening at the Greek Café, the centre of heliographic movement, and of a benevolent hospitality for all new comers.

They say that the Baron Gros has repeated with success at Paris an operation already tried at London by M. Archer. He tries to detach from the glass plate the impressed film of collodion to make of it negative stereotypes almost without thickness. This is the process, viz:

At the moment of the operation, the paper is softened with a damp sponge, and immediately lightly sized; they apply it afterwards upon a glass plate after the last washings, and they make it adhere there. The film of collodion then seems to quit the glass to adhere to the paper, it is raised, and as soon as the raising has begun at one of the corners, we help it, and continue it, by making a small stream of water run between the glass and the paper. Soon the little skin with the impression on it is detached entirely from the mirror and *unites no more* with the paper, which takes it up. The paper well stretched should be thin, exempt from all spots or marblings. We can easily see that this discovery if it should be fully confirmed has a sure fortune. Traveling photographers would no longer be obliged to carry with them more than one or two glass plates to get possession of an indefinite number of soft, free negatives, easy to pile up, perfectly transparent, &c.

There is much noise made at Paris about the manipulation of M. Bayard, which augments in such a proposition the sensibility of the paper, that the photogenic action is almost instantaneous; when the paper comes from the bath of nitrate of silver in order to be submitted to the action of light, it diffuses over the surface a solution of pyro-gallic acid, formed by eight decigrammes of acid to five hundred grains of water.

In speaking of the stereoscope, M. Lerebours says: "The stereoscope has obtained in England an incredible success; let us hope that in France this useful and amusing instrument will not be neglected." This phrase grieved us because it contradicted facts. Can M. Lerebours be ignorant that it is France that has made this very success of the stereoscope in England; that the innumerable apparatus, and

stereoscopic proofs more innumerable still, sold at London, are in a great degree of French origin. We maintain more than ever this passage of our last article: The stereoscope, perfected in the workshops of M. Jules Duboseq, has conquered France, England, Germany. Misunderstood and despised even in its mother country, when it was naturalized, it became popular and sought after." Stereoscopes and stereoscopic proofs are perfected only in Paris; they are sold also there, thank God, although they are one of those objects of usury of which the acquisition is rendered difficult by the moderateness of the fixtures. We find still that the epithets of *charming* and *curious* are too childish when the question is of an apparatus that increases an hundred fold the forces of photography. By-and-bye, when we shall be allowed to reveal a noble secret which has been confided to us, M. Lerebours will know better the future that France has prepared for the stereoscope, which is yet only in its cradle.

In fine, we recommend to photographers to procure, read and practise upon the little treatise upon photography on glass by M. Couppier. All those who, hitherto, had completely or almost completely failed in the delicate process of albuminating glass plates, have perfectly succeeded in repeating to the letter the manipulations of M. Couppier. We are fully authorised to make from this pamphlet the largest extracts, but in using this right we should certainly injure the rights of M. Couppier, without really being useful to our readers, who can attain the end only by following step by step the prescriptions of the author. He has promised us besides to make a very great remittance a remittance of two francs upon the copies of his pamphlets which shall be sold, and that they will be found at M. M. Charles Chevalier, Puech and Duboseq's.

The name of M. Puech recalls to us that we ought to have given him a place in the prospectus of our first number. He has created his special manufacture of chemical products for photography under the auspices of the Heliographic Society. The Cosmos will be faithful and aid all his efforts.

M. Plumier, one of the most skillful photographers, brought us some admirable

portraits without any retouching, obtained with the English collodion of M. M. Horne & Co., the best of all, according to him who has tried all. The portrait of M. Niepce de Saint Victor, among others, is a marvel. This time it is not DEAD TRUTH and LIVING ART.

Photography, which is in itself, a perfect delinator, a painter of perfect grey, is found transformed by means of the invention of the stereoscope into a super-human sculpture which digs and drapes as Phidias never digged nor drapped.

But there still remains something to do. To a crayon of great competency, to a chisel of power without bounds, it will be necessary to add the pencil of absolute truth, as the marvellous effects of the stereoscope will be increased a hundred fold, if we can ever be able to exhibit the photographic images in their natural colors. What immense progress! What an admirable conquest! The very thought of this triumph exalts the imagination and fills us with joy. We shall soon see with our own eyes those magical effects, and we shall soon see if our feeble voice can make itself heard and what it can accomplish.

It is more than three years since that M. Niepce, a captain in the republican guard, master-general Mouffetard, pursued incessantly the solution of this magnificent problem. This is the man chosen by Providence to solve the mystery, and he will solve it. He advances every day, every hour he adds a new color to his new palette; already we have to admire among the photographic proofs fine colors, the red, the yellow, the blue, the green, the white, each producing themselves with the proper tints; and these proofs submitted by us to the examination of one of the most skillful photographers of England, M. Malone, have excited a vivid surprise, a sort of stupefaction, that we could be able to produce such satisfactory results. These are only the rough draughts, this is only an aurora an infant in the cradle, but an aurora which will certainly attain the splendor of mid-day, a child which will certainly become a giant. M. Niepce de Saint Victor, modest and timid as he is, and who shuts himself in his laboratory, while he is strong in hope, and at the head of his company, is sure of success. He suffers to the very end of his fingers, while endeavoring to

bring his experiments to perfection. If the revolution of 1848 had not violently expelled from the *caserne du faubourg Saint Martin*, after having pillaged and burned his humble habitation, after having despoiled it of all which it possessed, if it had not destroyed all his works of art, the world would now receive the benefits of his experiments.

These essays in photography involve enormous expense, the plates of silver which are often destroyed, and the chemical substances necessary to be purchased, &c. The fact is, that the intrepid inventor has exhausted his expedients, and is forced to scrape the old plates from the impossibility of procuring new ones. And for us so much interested for the progress of art, for us excessively jealous for the glory of our beautiful France, these hindrances are a great calamity. Ah, if we could make it understood how we feel, the greatness and importance of the problem that M. Niepce de St. Victor would resolve, *nolens volens*, which he has almost solved, or will in a short time; the fixing of colors of nature upon photographic plates in their own colors. If the Prince President of the Republic who has so generously recompensed, and we thank him for it, a brilliant theoretic experiment, of the sensible demonstration of the rotation of the earth, would deign to grant his protection to M. Niepce St. Victor.

In substituting the albumenized glass for the silver plate and sensitive paper in inventing the negative stereotypes, M. Niepce de St. Victor has given an immense impulse to photography. His single negative proof suffices henceforth to furnish a hundred positive proofs; and these proofs transparent, and indefinitely put together in the stereoscope, produce unexpected effects. M. Niepce de St. Victor, in short, has entered alone into the sure road which infallibly leads to Photography. His triumph should be insured by a noble indemnity.

II. The Academy of Sciences, and the Society of Encouragement should grant this indemnity, if they would be faithful to their great mission. At any rate, we shall not stop, till the stereoscope has shown a portrait or a landscape drawn by nature itself.

Before quitting this subject, we will re-

late some theoretic and practical researches and new experiments of M. Niepce de St. Victor, which were not noticed in *La Lumiere* but were received with great favor by the Institute. M. Edmond Becquerel was the first to observe that a silver plate immersed in chloridated water, acquired the astonishing property of reproducing, under the action of light, the colors of the spectrum. To this first observation, M. Niepce has added a second more striking still. It is that the dominating color, that which shines upon the chlorated plate with the greatest brilliancy varies with the quantity of chloride contained in the solution. When it is the smallest possible, the dominant color is yellow; as it is more abundant, the dominant color becomes in turn, green, blue, indigo, violet, red, orange; these two last colors appear only when the solution is completely saturated. The salts of copper and deuto-chloride of iron give much vivacity to the colors, which are feeble when the chlorine is used alone. To obtain all the colors at once, we must adopt the proportion of chloride, chlorate, and salts of copper, to correspond with the mean rays of the spectrum. If in the absolute alcohol, we pour a small quantity of pure chloridic acid, we shall obtain in lighting it, a yellow flame. If we add progressively new quantities of acid, taking care to agitate the liquor, placed in a capsule, the yellow flame will pass by turns into green, blue, yellow and violet, which is produced when the alcohol is saturated, that is to say, when we can add no more acid without extinguishing it.

To obtain red and orange flowers, we should add to the liquid some chlorate or deuto-chlorate of copper. If we throw upon a pan of coals which are very hot, some chlorate of copper, containing the quantity of chlorine proper to produce a green flame only, when burning in the alcohol, we shall see produced almost instantaneously jets of flame of all colors of the spectrum, just as we saw all the tints fix themselves upon the plate, plunged into that of the chloride solution, corresponding to green as the dominant color.

Already, in another memoir, M. Niepce de St. Victor had pointed out a striking analogy between flames and colored images. The substances which, burning

in alcohol, communicate to the flame a determinate color, are such, that after having them dissolved, we steep a daguerrean plate in the solution; this plate, subjected to the action of the solar spectrum, will fix, as the dominant color, the very color of the flame.

III. These results are in their turn, brilliant and unexpected discoveries. We have not heretofore forseen these singular analogies, which throw a new light upon the mysterious phenomena of the production or nature of light. We will now speak, as we promised, upon the admirable portraits of M. Plumier; a skillful photographer soon learns that the sensibility of collodion diminishes, as we distance the moment of preparation. In the first days which mentions the reception of this substance, which comes as it is said, from England, its sensibility is very great, or about four times greater than the most impressionable metallic plates. In seven or eight seconds, we obtain the most beautiful portraits. We have seen them, and among others, a portrait of a little girl perfectly successful. After some days, the sensibility is less. The time of the exposure to the action of light ought to be half, at least, of the time of the exposure of the plate. Soon after, the film of collodion is no longer sensible. We cannot operate with it with more rapidity than with the plate.

A second important remark is, that the negative stereotype plate produced by the employment of collodion, becomes effaced, or exhausts itself rapidly. It is unfit to use after it has obtained a certain number of positive proofs. We see then why the addition of gutta percha becomes absolutely necessary. The sensible bed becoming thus stronger and more consistent, is much more profoundly impressed, and suffers less of subsequent action from the light. We vividly regret that the excellent process of M. Fry, has not yet been applied in France, and that it has not yet attracted the attention of any of our renowned photographers. Let us only hope, that the publicity we have given it in the second book of *Cosmos* will have a beneficial result.

IV. M. A de Brebisson, to whom the art of photography owes already several remarkable productions, some of them very

precious, as they have a practical character, has already advanced very far in his discoveries. Since the first announcement of the English journals, he has assiduously employed himself in the preparation and use of collodion, and it has so often and so well succeeded, that the want of success in operators, is inexplicable. To him it appears that the collodion is the most sensible of any substance known. He even goes so far as to say, that the one surpasses the other, that is, that we can excel by the one the quickness of the metallic plate and the most albuminated preparations, even those of M. Barcot, whose astonishing proofs we admire, representing the sea, with its raised and mountainous waters and billows breaking over the strand. M. De Brebisson has produced instantaneously upon the collodion, numerous views of squares and streets on market days, with a compact crowd in all the agitation of commercial affairs.

We have always desired to produce a photographic paper of a homogenous temperament, without any gaining and of an extreme sensibility. Collodion presents all these advantages. It is in effect only a delicate leaf or transparent covering that can be detached at need, as we have said, surpassing in fineness the most delicate paper; and which like the paper, can be completely impregnated by the photogenic solutions; and thus acquires an exquisite sensibility. Monsieur de Brebisson, however, recognised, and we are also profoundly convinced, that when any moveable subject is about to be reproduced, a landscape or a monument, nothing can take the place of albuminated plates, which, when dry, take the impression perfectly, and can therefore be prepared many days beforehand, and upon which the image can be made to appear and be fixed after the exposition to the light.

This would teach us, if the portraits of Plumier had not abundantly proved it, that the negative stereotypes upon collodion give to positive proofs a much softer aspect.

Since M. D. Brebisson, who is an earnest photographer, sincerely believed that the iodured collodion, prepared according to his receipt, is the most sensible, or at least, as sensible as the best English collodions, we will borrow the receipt.

1. *Preparation of Powder Cotton.*—Put in a vase of porcelain five hundred grains of the concentrated sulphuric acid; add by degree 400 grains of saltpetre or refined nitrate of potash, reduced to powder; agitate with a glass stick the mixture, which forms a kind of thick pap of the consistence of syrup.

Plunge into this mixture 20 or 30 drachms of cotton, well dried, not carded, many times, but rapidly, so that the immersion may be prompt and complete. Then stir and press it with a glass stick. Take out the impregnated mass and throw it into the water. Dissolve the adherent salt, then wash it in water, to take out every trace of acid; squeeze the water out of the cotton, by pressing through a napkin, spread out the fibrous mass and dry it in the open air or in a stove in which the temperature is not too high.

2. *Preparation of Collodion.*—Take cotton powder well dried 1 grain, sulphuric ether, 90 grains, common alcohol 60 grains; agitate these substances in a flask, then after some time press the liquid through a fine linen cloth and preserve it in a flask carefully closed.

3. *Ioduration of Collodion.*—Make two solutions, one with 30 grains of distilled water and three grains of azotate of silver, the other with 40 grains of distilled water, and 2 grains of iodide of potassium, pour by degrees the first solution into the second, it will form iodide of silver which will be deposited in the bottom of the vase, wash the precipitate well in water, and throw it upon a filter of paper. The water drained off leaves upon the iodide of silver a small quantity of alcohol for finishing the wash; put an excess of iodide of potassium into a flask filled with water at 33 degrees; when the alcohol is saturated, decant it, and you will have a concentrated solution of iodide of potassium; dissolve in that solution the iodide of silver remaining upon the fresh filter while it is yet humid; this done, take of collodion 50 grains, alcoholic solution 15 grains and you will have the ioduretted collodion. M. De Brebisson affirms that the sensibility will be much greater if we add 6 grains of a concentrated solution of iodide of iron in the alcohol mixed with three grains of iodide. When the collodion and the two alcoholic solutions are mingled, we agitate the flask,

then leave it to rest until the liquid becomes liquid, which demands at least twelve or fifteen hours; we then decant and preserve the clearest portion in a flask with a large opening to spread more slowly over the mirrors. The ioduretted collodion thus obtained ought to have a fine orange or red color. It will be simply yellow if we do not mix with it the iodide of silver.

4. *Sensibilisation of the Plates coated with Collodion.*—Plunge the plate into a bath composed of distilled water 60 grains, nitrate of silver 4 grains. If we wait until the bed of collodion becomes dry for bathing it in the solution of silver, it will be without sensibility.

5. *Appearance of the image.*—Take a solution of protosulphate of iron, add a twelfth part of crystalizable acetic acid, or simply of pure pyroligneous acid and some drops of a weak solution of silver; mix the whole well and plunge it with a single dash into the sensitive bath. The negative will appear in all its details. If it be not strong enough, place it horizontally upon the fingers of the left hand, throw upon its surface a solution of 100 grains of distilled water and 4 grains of nitrate of silver, having care that the limpid nap covers the whole of the proof totally. In about 20 seconds immerse it anew in the iron bath.

We would recommend these two used successively if we desire more vigor. M. de Brebisson remarks that the silver reduced by its whitish metallic aspect turns the stereotype plate seen upon a black ground into a positive proof, without making it lose its negative character when it is seen transparently.

6. *Fixation of the negative proof.*—The best of all agents is the hyposulphite of soda; if the solution is of 1 grain of salt, for 30 grains of water, we can leave the proof in the bath at least three or four minutes; the immersion ought not to be but one minute if the solution be at one-tenth, or of 10 grains of salt for 100 grains of water. We terminate the new wash by leaving the plate a certain time in the water. We can consolidate the proof after its being dried by pouring upon it a solution of 6 grains of gum-arabic in 30 grains of water passed through fine linen and purged from bubbles of air by means of a bit of blotting paper. We spread the coat of gum as well as possible by dipping the

mirror in on all sides; then after a moment of repose wipe off the excess of gum.

7. *Production of the Positive Image.*

—Plunge the paper during two or three minutes into a bath formed of 100 grains of distilled water, and 10 grains of chlorate of soda. Dry with a blotting paper, and extend the chloreted side upon a second bath of distilled water 30 grains, nitrate of silver, 6 grains. We can preserve this paper only a few days, for it assumes a grey tint more or less deep. M. de Brebisson thus proposes his other bath: Distilled water, 200 grains, chloride of soda, 8 grains; tapioca of groult 6 grains, to which is to be added 2 or 3 grains of tartaric acid or of succinic acid. If we wish to have the tones more or less bistre, one must place this mixture upon the fire, when the tapioca is dissolved, we pass the whole through a linen cloth, we then glaze some sheets of paper strong and very white by means of a pencil of horse hair; and to make the striæ disappear, we take off quickly the sized surface with a large badger pencil which proceeds rapidly in describing the near circles.

8. *Fixing the positive proof.*—We plunge into a bath the tenth part of hyposulphite of soda 10 grains, water 100 grains, and we have it at least two hours and even much longer if we wish to obtain dark tones, on condition that the proof shall have been much exposed to the sun. On issuing from the hyposulphite we wash it repeatedly in water; it will be even good sometimes to wash it for the last time in boiling water; then dry it upon inclined blotting paper: the proof takes a vigorous tone remarkable on approaching the fire and completely drying it.

V. M. Bingham the English photographer, who was charged with procuring photographic proofs representing all the crowned heads by the Commission of the World's Fair, and, who at Versailles, in a charming villa, produced every day for years, the proofs which ought to complete the illustrious catalogue, has presented to the Academy of Science some fine proofs upon collodion. He gives at the same time the receipts which have produced the best results. We record them with much more earnestness as M. Bingham gives his own authority about collodion; he has preceeded M. Archer, whose publications

are dated from 1851, whilst in a pamphlet dated 1850, M. Bingham announced already the employment of collodion as taking the place of the albumen. It is true, however, that he did not discover the great sensibility of the collodion, because in the development of the image he used gallic acid in place of the pyro-gallic acid used by M. Archer.

1. *Preparation of Ioduretted Collodion.*

—We place in a flask eighty-seven grains of cotton powder dissolved in a solution of 35 grains of iodide of ammonia, 13 grains of fluoride of potassium, and four or five drops of distilled water. The mixture agitated takes a pale yellow tint if the cotton powder has been exempt from acid; without that it will be deep red, and this will be an inconvenient impression. We can substitute for the iodide of ammonia 46 decigrammes of iodide of silver with 68 decigrammes of iodide of potassium, and some drops of water. After the agitation and a repose of some hours, this second mixture is white or a slight yellow, and it is then only that it is necessary to use it. The glass supported upon a cylinder of gutta-percha rendered adhesive by heat, ought to be dried at first with the buffer of cotton soaked with tripoli and ammonia, then with a very fine cotton rag soaked in pure alcohol.

2. *Sensibility of the Plate.*—After the bed of ioduretted collodion becomes dry, we plunge the plate into a bath composed of 31 grammes of distilled water, and 26 decigrammes of nitrate of silver; we leave the plate immersed for half a minute, and when the surface has become white, we put it into the dark camera.

3. *Development of the Image.*—We place the plate upon a support, and pour rapidly upon it a mixture of two parts of pyro-gallic acid, eighty parts of acetic acid crystalized, and five hundred parts of water. If the plate has not been sufficiently impressed, we can add some drops of nitrate of silver. In two minutes the image appears very well developed, we then wash it with water, and fix it by means of a solution saturated with hyposulphite of soda, we then dry it by a lamp or in the open air.

M. Bingham affirms that by this process we obtain very good negative stereotypes in the shade, and with a German object-glass in three or four minutes.

To obtain the positives directly, it is necessary to leave the plate exposed a shorter time to the action of light and to plunge it into a mixture of pyro-gallic acid, wet with one or two drops of the nitrate of silver.

LIFE OF EDWARD BIRD.

BY A. CUNNINGHAM.



EDWARD BIRD was born at Wolverhampton, on the 12th day of April, 1772. His father, a clothier by trade, was a man of sense and information, and gave him a fair education. His mother watched over him—for he was a weakly child—with the most anxious solicitude. When very young—the family tradition says three or four years old—he began to sketch. He would stand on a stool, chalk outlines on the furniture, and say, with childish glee, as he eyed his labors, “Well done, little Neddy Bird!” He would be up with the dawn to draw figures upon the walls, which he called French and English soldiers, and was continually in disgrace with the servant maids of his father’s house, who had to make use of their mops and scrubbing-brushes after those early risings.

He was privately encouraged in these pursuits by his eldest sister; now Mrs. Baker; his first box of colors were purchased with her pocket money—long hoarded for that purpose: and after he had risen to distinction, “Sarah,” he would sometimes say, “I may thank you for being an artist.” Nor were his talents in those childish days unfelt by his father; but remote from collections of paintings, unacquainted with the fame they bring, and their influence with the world, the worthy clothier never thought of his son becoming a painter by profession, and regarded it as at best a pleasing but unprofitable calling. His first attempt worthy of notice dates in his fourteenth year—this was the imaginary interview between the Earl of Leicester, and the daughters whom Miss Lee has con-

ferred on Mary Queen of Scots, in her novel of “The Recess.” It is now in the house of the artist’s widow.

When his father saw that his love of drawing and sketching was incurable, he began to grow anxious to turn it to some account, but could think of nothing better than apprenticing him to a maker of tea-trays—these accordingly it became the boy’s business to ornament and embellish. Birmingham then, as now, sent over the world many productions of domestic usefulness, which require not only skill of hand, but good taste and some fancy. On such things Bird first tried his pencil, and was soon distinguished above his fellow-workmen for the neatness and beauty of his embellishments. Of this there is a strong proof: long after, when his name was in the ranks of acknowledged genius, he was on a tour in France with several companions, and at Boulogne drank tea off a beautiful tray which excited their notice and praise. Bird looked at it and smiled; when they had recommenced their journey, one of his friends said, “I did not think they could have made such trays in France.” “It was not made here,” said Bird, “It was made in Birmingham, for I painted it.” One of the party was with difficulty restrained from turning back and buying it. Works of this nature, however, are, in a great measure, produced by a kind of mechanical process, in which genius claims little share. The daily reproduction of the same shapes and the same ornaments is but a wearisome task. To dedicate the golden hours of his life to gather wealth for the benefit of some manufacturer, was the original curse of Bird’s condition, and he no sooner had the sense to perceive this

than he found courage necessary for setting himself free.

When his indentures expired, very advantageous offers were made to induce him to continue with the "trade;" but he refused them all, and probably without any defined plan of conduct for future life, resigned a connexion which, with talents infinitely below his, many could have made highly lucrative.

Bird had long felt that yearning after distinction which genius ever feels; he had improved his knowledge in the nature and use of colors; his eye was already familiar with the human form, and his mind stored with those images of social humor and fireside affection in which his strength lay. Of nature as he felt it, and of manners and passions, he had produced many sketches with the pencil—some he had tried to make permanent in oil; and his confidence was daily increasing with his skill.

It was to the advantage of his art that he was thus self-instructed—for his genius was not of that powerful and self-relying order which gains much and loses nothing in the lecture-room and the mechanical workshop attached to academies. The routine of a regular education in art would probably have tamed down the gentle fire with which nature had endowed his bosom to a very insignificant spark.

Though Bird listened to the call of ambition, he was a wise and a prudent man, and obeyed it but in part. He relinquished all connection with Birmingham and her teaboards, removed to Bristol, and commenced a drawing-school. During the intervals of instruction, he sketched, designed, and painted with all his early ardor, and with success such as follows patient self-discipline. He, by-and-by, thought so well of his works, that he ventured to show some of them to his friends, and among others to Mr. Murphy, an artist of taste and feeling, who liked them so much that he advised their being exhibited. To this Bird was averse for some time, but he at last consented to send two to the Bath Exhibition. It was necessary that a price should be named; the painter wrote down ten guineas each: his friend, with a better sense of their merit, wrote down thirty; and they found ready purchasers. This was in 1807, when Bird was in his thirty-fifth year. His

sketch-books, says Mr. Murphy, were at that time filled with subjects fit to expand into paintings, and contained scenes of all kind, serious and comic. They were marked by an original spirit, and showed a natural skill in grouping. The Interior of a Volunteer's Cottage was the subject of one of his works; and Clowns dancing in an Ale-house another. The threats of a French invasion had

"Brought the freeman's arm to aid the freeman's laws."

and Bird had the bayonet of a volunteer at that time in his hands. He was surrounded by a growing family. Fame and money were both desirable, and they were both obtained. Art cannot be followed without incurring expense; and the very reputation which genius acquires is a tax upon the pocket by bringing friends and strangers. Our painter's heart opened with his fortune: he was never a profuse, but always a very liberal man.

His first successful work, if we measure success by the applause of the world, was called "Good News." Some of his earlier pictures, I have heard good judges say, were of higher merit—and this is not unlikely: it seldom happens that the first original work which genius produces seizes the attention of mankind; it is considered by many as the lucky hit of an ordinary mind, and passed by till it is recalled to notice by a continuation of works from the same hand. "The Choristers Rehearsing" and "The Will" followed, and received equal praise, and, what was not less fortunate, obtained purchasers of high distinction: his late Majesty bought the first, and added judicious commendation to liberal payment; and the other was purchased by the late Marquis of Hastings. The Royal Academy soon afterward conferred honor on themselves by enrolling our self-taught artist among their number.

His next work was the most poetical, and decidedly his best one. This is a representation of the Field of Chevy Chase on the day after the battle. It is painted in the mournful spirit with which the glorious old ballad concludes, and cannot well be looked on without tears. These are the words embodied:

"Of fifteen hundred Englishmen
 Went home but fifty-three ;
 The rest were slain in Chevy Chase
 Under the greenewood tree.
 Next day did many widows come
 Their husbands to bewaile ;
 They washed their wounds in brinish tears,
 But all would not prevayle.
 Theyr bodies bathed in purple blood
 They bare with them away ;
 They kist them dead a thousand times
 Ere they were cladd in clay.

Of this heroic ballad, which Sir Philip Sydney said roused him like the sound of a trumpet, and which Ben Johnson affirmed was well worth all his dramas, the people of England are great admirers, and among the peasantry of the south it is almost the only one known. When they saw a painting which gave a life-like and touching image of a scene often present to the fancy, they were loud in its praise. Lady Percy is, with perfect propriety, made a visiter of the fatal field: she appears in deep agony beside the body of her lord. The old Minstrel thought proper to slay Percy by the spear of Sir Hugh Montgomery, and we appeal to history in vain against the poet's decision. The gentle Kate of Shakespeare, who said to Hotspur, in his interview with Glendower, "Lie still, thou thief, and hear the Welch lady sing," had that sorrowful duty to perform at the battle of Shrewsbury, stricken many years after Otterbourne. This exquisite piece, which should have been purchased by some wealthy Douglas or Percy, was bought for 300 guineas by the Marquis of Stafford; while Mr. (now Sir Walter) Scott acquired the original sketch. The same munificent nobleman purchased Bird's next picture, the Death of Eli, for 500 guineas; and the British Institution added their testimony to its merits, by presenting the painter with their premium, amounting to £315.

Concerning the picture of the Death of Eli a curious story was circulated. Bristol long endured the reproach of parsimony both in prose and verse. Two English poets have expressed themselves with no measured bitterness of spirit concerning the sordid spirit of its merchants. Thus sings Savage—

"Upstarts and mushrooms; proud, relentless hearts;
 Thou blank of sciences! thou dearth of arts!

Such foes as learning once was doomed to see,
 Huns, Goths, and Vandals, were but types of thee."

And Robert Lovell is equally severe—

"No mild urbanity attracts the sight,
 No arts of skill, or elegant delight;
 But sordid wealth inspires the general cry,
 And speeds the step and sharpens the eager eye;
 Foul as their streets triumphant Meanness sways,
 And grovelling as their mud-compelling drays;
 Discordant sounds compose the Babel hum,
 'Tis—how goes sugar? what's the price of rum?
 What ships arrived? and how are stocks to-day?
 Who's dead? who's broken? and, who's run away?"

If such reproaches were ever due, they are so no longer: Bristol has now her literary and scientific institutions, and can point to many individuals of the most refined manners as well as the most generous liberality among her citizens. Touched somewhat, however, with the spirit described in Lovell's verses, three gentlemen of that city subscribed 100 pounds each, and commissioned as it is called, a picture from the pencil of Bird. He painted the Death of Eli. The lucky proprietors sold it for 500 guineas; and, inspired with this, perhaps, unexpected profit, clubbed their hundreds again, and waited on the painter with a fresh commission. But he had no wish to have his brains sucked at that rate, and declined their proposal. The meaning of these citizens in their first offer was kindly; they wished to inspire the artist with a proper confidence, and made remuneration certain; but they could not resist the temptation of gain. They ought to have paid Bird the whole sum which they received, and not sought to enrich themselves under pretence of friendship. But neither the satire of poets nor individual parsimony must conceal the fact that Bristol took an affectionate interest in his prosperity, and that he found many friends and patrons among her citizens.

Business about this time took Bird to his native town. He was personally recognised by many, and received with an enthusiasm which would have been creditable to a place of higher pretensions. His early companions gathered about him, and he made them cordially welcome. Many of those persons survive, and they all, and of their own accord, when his name is mentioned, speak first of the active kindness of his heart, and then of the early indica-

tions of his talents. "I knew Ned Bird, sir," said one of those humble friends, "when he was a boy at school; he never thought of himself; he would give the one-half of his dinner to a beggar-woman and the other to a lame soldier, and fast upon his lesson." Nor had increase of years hardened his heart. One night, as he was on his way to his lodging, a woman ran wildly out of a door, crying, "My child! my child!" Bird went into her house, and finding one of her children in strong convulsions, instantly brought a physician. "Look to the boy," said Bird, "and look also to the mother; she seems to need it much: I will pay for all." He returned next day, gave the poor widow a present of money, and when the child, which recovered only for a short time, died, he buried it at his own expense.

On his return to Bristol he recommenced his studies. His chief merit as an artist lay in natural and touching representations of homely and social things: history, either profane or sacred, requiring a spirit more in unison with the magnificent and majestic, and an imagination of a more heroic order. He had *seen* the living nature which the former requires, and had taken frequent sittings: he had to *conceive* the nature which belongs to the latter, and in that rare quality he was found deficient.

His picture of "Good News" is a happy performance. The group which he assembled in the little ale-house has no doubt recalled similar scenes to all who have observed it. "The Blacksmith's Shop," an early painting of much promise, was touched with the same spirit of social glee; and the "Country Auction" is ranked by many as one of his cleverest pictures. The sound of the auctioneer's hammer has called together a motley crowd, all anxious to bid for articles, and all bidding in character. An old gray-headed peasant has bought a large Bible; his son-in-law hesitates between a punch-bowl and a cradle; and his daughter sees nothing but the glitter of a tea-table service. A cautious gamekeeper and a bustling butcher are contending for a fowling-piece. A little girl has placed a burnished cullender above her curls, and eyes a mirror with much satisfaction; while a gaping crowd of rustic connoisseurs are examining, with all the empty sagacity of a committee of taste, into the merits of an

old daubing about to be exposed for sale. The coloring of the whole is mellow and harmonious.

Nor was he less skillful in subjects where the interest was confined to a single figure with little action. When he happened to meet an original-looking personage, young or old, his practice was to make a rude sketch on the spot—return to his study—assign to the figure some characteristic employment—expand it upon the canvass, and give it all the charm of coloring. He painted such works with astonishing rapidity; the picture existed complete in his mind, and an effort of art and memory reproduced it. During the stormy season of 1812 he was in London—found a famishing match-girl in the street—painted her in character in three days, and sold the work for thirty guineas. An old man seeking alms came across his way: of him too he took a characteristic likeness—half real and half imaginative, and with equal success. Accurate copies of nature he disliked; he took a poetic license with his subjects: he had a happy knack of combination, and formed clever and consistent groups out of very discordant materials. "He could," said one of his admirers, "extract delight and joy out of any thing: I mean personally as well as with his pencil." "The Gipsy Boy," "The Young Recruit," "Meg Merrilies," "Game at Put," and various other paintings, are all instances of his skill in adapting living life to the purposes of art. In this respect he resembled Opie. When one of his friends congratulated him upon the rapidity with which he dashed off his lesser, but his happier works, Bird said, "Yes, I can do them quickly; but it will not do to tell the world how soon I can paint such things." They who believe that what is done well cannot have been done quickly, are often mistaken.

The reputation of these paintings recalled public attention to his earlier productions, and "The Village Politicians," a cabinet picture, and "The Poacher," in six scenes, came out of obscurity. In these six pictures he conducts a peasant from his happy fireside through the varied fortunes of a poacher's life: seeking for game with his companion; carrying it home to his wife and children; selling it by lamp-light to the guard of a coach: betrayed by his comrade; admonished by a clergyman in pri-

son; and restored to his family an amended man with a resolution to be wise in future. I fear the poacher's career seldom terminates in a manner so pleasant to contemplate.

Sometime during the year 1813, Bird obtained the notice of the Princess Charlotte, who, young as she was, perceived the true native excellence of his works, and expressed a wish to see the artist. He was introduced, accordingly, at Warwick House, and was charmed, as all were, by the grace and kindly dignity of her manners. Encouraged by her courtesy, which had no chilling stateliness about it, he spoke readily and well, and acquitted himself so cleverly that her Royal Highness took an opportunity of saying to Mr. Murphy, who introduced him, "Mr. Bird is a very well-bred man—he has a natural politeness about him." The princess promised him her support, and appointed him her painter, on which he made her a present of a work he had lately finished—"The Surrender of Calais." This work was a favorite production, and he desired, very properly, to place it in the best company: alas! in that enviable situation it was not long to remain. That sad event happened which brought tears to all eyes, and of which one of our best poets has so mournfully sung.

"In its summer pride arrayed
Low our Tree of Hope is laid!
Low it lies;—in evil hour,
Visiting the bridal bower,
Death hath levelled root and flower;
Windsor! in thy sacred shade,
This the end of pomp and power!
Have the rites of death been paid;
Windsor! in thy sacred shade
Is the Flower of Brunswick laid!"

On the death of our painter, his widow wished to exhibit his works, and applied to Prince Leopold of Saxe-Coburg for the loan of "The Surrender of Calais:" the Prince did more than was asked, or expected, or indeed wished—he presented the painting to Mrs. Bird, accompanied by a donation of a hundred pounds.

During one of his visits to London, Bird sat for his bust to Chantrey; and the writer of this very imperfect account had thus many opportunities of conversing with him. He said he had no regular system of study; he painted and sketched just as it suited him, and when once he had sat resolutely

down to his easel, it was no easy thing to make him quit it. The subject once settled, he generally painted fast, and when fastest, best. He wrought much by candlelight, and in this manner he painted his Death of Eli. At this time Mr. Chantrey was busied with one of his cleverest works—the figure of Lady Louisa Russell—a child fondling a bird in her bosom, and standing on tiptoe with delight. As the sculptor was anxious to have it ready for the approaching Exhibition, he stuck a candle in the front of his hat, took a chisel in his hand, and labored at the statue during the evenings. On one or more of those occasions, Bird was his companion. The light in the sculptor's hat glimmered as he moved his head among busts, and groups, and statues—some emerging from the block, some rough-hewn, and others fully finished. The singular scene took the painter's fancy, and he resolved to make a picture of it. I wish he had finished this very original design: he left it sketched in oil. Chantrey appears in the act of carving one of the feet of the figure, surrounded by his other works, over which there is shed a partial illumination. When the bust of Bird was finished, Skirving of Edinburgh, an artist of some talent and more eccentricity, paid the gallery of the sculptor a visit. He fixed his eye on the bust of the painter and said to the person who showed it, "Well—and who is that?" "It is Bird—Bird of Bristol." "Bird! what strange bird is he?" "He is an eminent painter." "Painter! and what does he paint?" "Ludicrous subjects, sir." "Ludicrous subjects! have you sat?" Upon this the other answered, "Yes, he has had one sitting; but when he heard that a gentleman with a white hat, and who wore no neck-cloth, had arrived from the North, he said, 'Go, go—I know of a subject more ludicrous still: Mr. Skirving has come.'"

These visits to London, and his admiration of the historical pictures of the great painters, wrought a sore change on Bird: he forsook that style of art natural to his feelings, and dedicated his pencil to far other aspirations. He became affected with a kind of Scripture mania. He thought only of sublime passages in the Bible, and scenes of religious tragedy which the Reformation furnished. The fortitude of Job, the Death of Saphira, the Cruci-

fixion, and the burning of Ridley and Latimer, are among his latter works: they found admirers and purchasers. There is considerable talent in these paintings and some pathos; but they are deficient in that regal loftiness of look which the subjects require, and without which merely clever works are but processions of puppets. Our Redeemer's Atonement had already been painted by higher hands, and the Martyrdom of the Bishops is a subject too horrible for any genius to render acceptable.

Those works having failed to yield fame to the artist in proportion to the toil they cost him, he filled up the measure of his sorrow by attempting what I may call the political style of art. The times in which Bird lived teemed with events of vast importance: kings and thrones appeared and disappeared like figures in a disturbed stream; and the splendid sun of Napoleon was setting as it rose, in blood. We all remember, and many of us witnessed, the departure of Louis XVIII. from his English exile for Paris. The painter had awakened a deep interest by his Surrender of Calais: he probably imagined that the farther he came down the stream of national story, the interest of the subject would increase; and in an evil hour for his own happiness, he resolved to paint the Embarkation of the French King and his attendants.

Of this work—which proved to be his last—Bird soon made the sketch, and all that he wanted was the likenesses of certain important personages. From Louis himself and his courtiers—men who, having suffered from oppression, had learned to be merciful—he received polite and kind attention. The old King praised the generous English, and the Duchess of Angoulême spoke highly to the honor of our ladies. But some of the nobles of his native land, whom he wished to introduce, were by no means so tractable to our artist; who seems indeed to have been little skilled in the arts of courtly conciliation. They answered his applications very civilly, but day after day neglected to bestow on him the necessary sittings. His patience and at length his health failed him, after a sore trial of many months. The death of a son and a daughter, whom he tenderly loved, pressed grievously about the same period upon his feelings; he grew peevish and dejected, and a drooping look and unsteady

step began to give notice that his days were numbered.

It is painful to think that the sensitive feelings of a man of genius should have been at the mercy of people thus unconscious or neglectful of its claims; but it is still more painful to think that he dedicated his time to processions and pageants, in which the likenesses of such ephemeral personages were necessary to his purpose. Bird slowly sunk under the pressing misery of hope deferred, diplomatic excuses and courtly delays; and on the 2d day of November, 1819, felt no longer the insolence of office. He died in the forty-eight year of his age, and was buried in the cloisters of Bristol Cathedral.

Three hundred gentlemen of Bristol joined in the funeral procession of their favorite painter, and when the grave received his remains they were so much affected with the sight of his son—a child of seven years old, who was there as chief mourner—that they requested leave to bear the expense of the interment. This Mrs. Bird, with modesty and good feeling, declined. A colder tale is, however, told, and even credited far from Bristol. Those three hundred gentlemen, it is said, obtained with much entreaty, Mrs. Bird's permission to bury her husband with all the honors of the city and at their own expense. The scene was splendid, and many were the external symptoms of public wo; but when all was over, the undertaker presented his bill to the widow of the painter. If this story be true, the sarcasms of Savage and Lovell are merciful and kind—but I believe it rests on no sufficient authority.

Edward Bird was in stature below the middle size, his eyes were expressive, his smile particularly winning, and his whole look full of intelligence. He was an admirer of truth, loved good order in his family, and kept strict discipline among his children, who loved and feared him. The air of rusticity which hovered about his person wore off as he became animated in company: there was much about him to please and even captivate, and, what all men reverence, a perfect sincerity of heart. Towards the close of his life his looks grew dark and melancholy; but this was less the fault of his mind than of his fortune; he felt that the world of fashion which he had worshipped was making its own return—

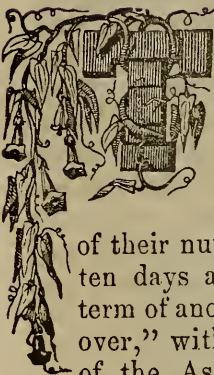
neglecting while it praised, and spurning while it caressed him.

The early works of Bird have an original and unborrowed air, which mark an artist who thought for himself, and sought the materials of his pictures in the living world around him, rather than in the galleries of art. In these he was eminently happy, and his very success was the cause of his after-sorrow. A swarm of counsellors came round, who persuaded him that fame was

the satellite of fashion, and induced him to forsake the modest path to permanent reputation, and follow the will-o'-wisp of pageant-painting, which led to the slough of despond, and to despair, and the grave. Those who wish well to the fame of Edward Bird will speak of his paintings of humble life, and seek to forget not only these mistaken efforts of his declining hand, but even his historical productions, with the single exception of Chevy Chase.

THE AMERICAN ART-UNION.

BY J. K. FISHER.



HE managers advertise the pictures purchased during the past year to be sold at auction on the fifteenth of December, just ten days before the expiration of the term of office of one-third of their number, and just a year minus ten days after the expiration of the term of another third, who have "held over," without giving to the members of the Association a chance to elect others. That men whose power is departed, or about to depart, should take the liberty to sell the property of their constituents without consulting them, when by their constitution their annual meeting is but ten days off, is a suspicious circumstance, that warrants the apprehension that the charges of obliquity brought against them are true. But, besides this published and unquestionable evidence, we hear, from sources that we cannot doubt, that they intend to bring down the institution with a crash, to force a sale at auction, with the full knowledge, from the result of recent sales, that the prices will be ruinous, will not even pay the \$16,000 of debt they contracted last year, much less pay one cent to the subscribers; and

all this for the malignant purpose of showing artists a comparison of the list of auction prices with the list of prices they have hitherto paid. Upon this point we shall comment further on.

To reconcile the covetous portion of the subscribers to this act, the idea is allowed to be entertained that the valuable real estate, consisting of one lot of ground, and two galleries, in fee, and two lots and a valuable building on leasehold, worth altogether \$60,000, is to be sold and divided among the subscribers of the past year. This would return them their five dollars each in cash, besides their "valuable prints worth \$20 a-set," and their bulletins, worth \$5, a matter of \$30 each for \$5 "invested." But for the old subscribers, who have stood by the institution for 12 years, the idea has been held out that the division of the proceeds is to be in proportion to what each has paid—he who has subscribed for twelve years is to have twelve shares, and he who has subscribed for one year is to have one share. Now, few are likely to get more than one share each, as to those who have subscribed only for the past year, we cannot see why they should divide among themselves a fund to which they not only have not contributed

a single cent, but from which will have been drawn a considerable amount to pay for the debts incurred on their account, for works to be distributed among them, and now to be sold nominally for them, but really for certain of the managers who have advanced \$16,000 on the famous "drafts on the treasury." They may think that they have been egregiously cheated; but to indemnify them out of a fund contributed by others, for the stipulated purpose of establishing a free gallery would be wrong; and this wrong we hope the subscribers resident hereabout will prevent by a timely resistance or injunction to stop the meditated sale, and by demanding the resignation of that third of the managers who have still another year to serve, and by electing an entire new board, who will continue the institution and sell the works at private sale, or assign them to such members as may accumulate certificates of membership to a sufficient amount.

As to the building and lease they should be continued in their covenanted use as a free gallery. They are so situated as to be of little or no value to the concern unless they be so continued; we learn that the lease cannot be sold, but must revert to the landlord if not used as a gallery; and as for the freehold part, it has no entrance except on Mercer-street, and through the leasehold part.

Now, it has been suggested that the pictures should remain as stock to be credited to the subscribers of the past year; and that the institution, with an amended charter and new constitution, and a new board of directors, should go on, and receive subscriptions annually, until members had paid in enough to entitle them to pictures, or until they had purchased the shares of others to a sufficient amount. In the meantime, the funds should be loaned to artists on the security of their works, at the highest rate of interest bid—presuming that the legislature will sanction the transaction, as it has done in the case of the Building Associations. This would afford the means of production to artists, and a rapid increase of funds to the subscribers. And it has also been proposed that the walls should be rented to artists in portions for the exhibitions of their works, and in this way the rent of the gallery may be paid.

These views seem reasonable and practicable. But besides, it is claimed by a Journal conducted by one of the managers, that the Court of Appeals has not decided that the distribution by lot is *unconstitutional*—it is merely a violation of the statute, and the legislature may legalize it. If this be true, the annual distribution may take place after a short delay.

Believing this to be the case, we claim, on behalf of the art and the public for whose use the property was given, that the institution shall not be destroyed to gratify the vindictive spirit of the present managers, whose insolence and oppression has been the cause of a loss to the subscribers of more than \$60,000 and to the institution of a further loss of an unknown but probably great amount. We claim this as a matter of justice, and hope that the honest subscribers will resist the meditated ruin of the institution.

We may be told that we have no business to obtrude our advice; we think otherwise; the property has been given for the public and the art: and, as a portion of the public, and in some degree a representative of art, we have a right to demand justice. We therefore take the liberty to offer the following plan of compromise.

1. The present managers to retire, and a provisional board to be selected, on the Friday evening next before Christmas.
2. The provisional board to apply for an amended charter; which shall make artists eligible as directors; which shall authorize the distribution on the London plan; and secure the property of any future managers.
3. The new charter obtained, new directors to be chosen.
4. The debts to be paid out of the general fund.
5. The present members to be credited with the works purchased with their money, or a distribution to be made, the institution retaining the shares it has paid for.
6. All future operations to be conducted lawfully, without a distribution by lot if that be not legalized, and without the shallow pretence that the prints, bulletins, and other matters; are an equivalent for the subscription, and that, therefore, the pictures are a mere gift, and hence not subject to the statute against lotteries.
7. All publications of prints, magazines,

&c., to be stopped; and the subscribers allowed to purchase such *works of art* as they prefer with their certificates.

But a short time remains to stop this spoliation; the subscribers should therefore be prompt. The courts, we learn, will be

bound to grant an injunction if it be applied for; and the district attorney is bound to sue for a penalty of thrice the value of all the works ever distributed by lot.

From the Scientific Daguerrean.

CHEMISTRY.—No. I.

BY GURDON EVANS, A. M.



N past ages no branch of science seems to have appeared so formidable to people at large, indeed to men of erudition, as Chemistry.

For centuries the devotee of this science confined his operations to a secluded corner, regarded by his fellows as a being of superhuman powers, and one of the very few permitted to enter within the vail of the sanctuary of this science, and there hold converse with the gods. Not till within the last century has much progress been made in popularizing this science, nor can it now be regarded as thoroughly domesticated. A mystic veil still beclouds it, and it is regarded by the people at large either with a species of distant awe, or blind contempt. This need not, and ought not to be. A science, at this age of the world so intimately connected with every mechanical art, and agricultural or household duty, should form an important item in every persons attainments. It may indeed be a question whether a knowledge of this science so thorough as desirable is found among the classes most intimately connected with it, and directly interested in its operations. The druggist, the daguerrean and the metallurgist, are they as they should be, masters of the science? Yet perhaps no censure should rest upon any, as this manifest deficiency is less a fault of the individual, than of our popular system of education.

A people can hardly be expected to obtain a knowledge, or even a favorable impression of a science which is not taught them in the schools to which they have access. And under the circumstances, the adult, if educated, must be so through the public press, and perhaps no more available medium exists for disseminating the elements of this science among the mass of juvenile mind.

The object of this series of articles shall be to *popularize* the Science of Chemistry, and far as possible develop its practical bearing upon the daguerrean, druggist, apothecary, cook and all.

CHEMISTRY explains those changes of form and character in matter which take place without a visible external agency, while natural philosophy treats of changes of form and place in matter, resulting from the application of external force. To illustrate this definition, we can easily understand how and why a biscuit receives a certain form in the hands of the cook, but we cannot understand so clearly the force which produces a gas in that same biscuit by which it is raised or *puffed up*—the last change resulting from a *chemical* force, while the first was the effect of a mechanical operation. The effervescence of a glass of soda water—a chemical action—is the result of a force altogether invisible, while tipping it to our lips is a process quite intelligible.

Green vitriol or copperas, composed of iron, sulphur and the gas oxygen, during

the process of its manufacture, presents changes of form well adapted to illustrate the nature of chemical changes.

First, Iron, a well known metal, is combined with oxygen of the air forming *iron rust* or oxide of iron, a powder of a reddish brown color. Next, the sulphur is combined with oxygen of the air and water, and forms oil of vitriol or sulphuric acid, a clear liquid composed of a solid—sulphur and a gas oxygen. Now put together the oxide of iron and the sulphuric acid; a new compound is formed, of a greenish color, in the form of a crystalized salt, copperas or sulphate of iron. Thus at each successive step a new substance is formed differing widely from either of its constituent parts, in form, appearance and character. This is indeed one peculiarity of chemical changes. A piece of wood or cotton may be cut by the mechanic into numberless forms, still what remains after

every change of form is wood or stone. Not so with chemical changes. Each new arrangement of the constituent elements produces a new substance often widely different from the original.

In Chemistry, however complicated results may appear, and however little relation the effect may have to the cause, every operation is based upon fixed and constant laws. The combination of oxide of iron and sulphuric acid always produces copperas, and nothing else; the mixture of potash and nitric acid always produces salt-peter; dissolving silver in nitric acid always produces lunar caustic, or nitrate of silver. In short, there is no *guess work* about it. The laws of chemistry once known and observed, the results are as certain as any other of nature's operations. The return of dry and night, seed-time and harvest, are no more certain.

GOSSIP.



HERETO the photographers of this country have confined themselves exclusively to the practice of their art upon the silvered plate, but, if we are to judge from the constantly increasing demand for photographic paper and paper chemicals—it will not be long before photography upon paper will be as extensively practised as the daguerrean art. The beautiful results obtained by the Messrs. Whipple and Black, of Boston, have undoubtedly contributed to enhance the interest in the paper processes. These gentlemen have produced

proofs upon paper far excelling any of those coming from either English or French manipulators. We consider them superior, because they come from their hands in a finished state, fine in tone and softness, excellent in color, and almost perfect in outline, roundness and perspective, without the aid of the brush, which cannot be said of the European photographs, they being more or less retouched.

Specimen portraits, by these gentlemen, which we have in our possession, must convince every candid and artistic mind, of the superiority of paper over the metallic plate, both for views and portraits, when properly prepared and impressed.

The success of Messrs. Whipple and Black has entirely dissipated the objections of M. Lerebours, of Paris, whose article on

this subject, we published in our last July number. All his objections are fully met and proved erroneous, by the photographic portraits that issue from their studio. The daguerreotype plate never produced a more faithful or exquisite portrait than the papers of these artists have already done, and when we call to mind how recently their first attempts were made, we cannot doubt a still more rapid improvement, and a speedy arrival at perfection.

We prefer paper photographs, because they are

1st. More artistic in appearance, as well as natural in fact; for as the daguerreotype reverses your position, and must necessarily misrepresent you to a greater or less degree, the paper portrait is a perfect transcript, every feature, every line, every expression is in its proper place, and consequently must be a more perfect likeness.

2d. More distinct from every point of view, and free from that disagreeable reflection that is always a detriment to the best daguerreotypes.

3d. More susceptibility to an infinite variety of tones and color, which in large collections, particularly of views, is very necessary in order to avoid a cold monotonous effect, necessarily produced by too much sameness.

4th. More convenient for preservation and exhibition, and

5th. Less liable to be injured by accident, and when injured, more easily restored.

To all these advantages we expect shortly to add greater durability. In fact we now think that paper is much more durable for photographs than metal. Exposure to air does not change it so readily, we all know. Allow a daguerreotype to remain unsealed for one week, and it will undergo oxidization, whereas paper may remain in precisely the same situation for months without perceptible alteration. Some of the photographs in our possession have

been openly exposed two years, and not the slightest change either in the color of the paper or picture has taken place, and we know of others that have lain more exposed still for five years, without suffering except from the dust.

If these facts do not prove the superiority of paper photographs over the daguerrean, there is no use in multiplying them.

— THE ANTHONY PRIZES.—We give this month our promised engravings of the prizes offered by Mr. E. Anthony, for the best four-fourths and one-half daguerreotypes to be executed previous to the first of November, 1853. The first prize is a MASSIVE SILVER PITCHER, twenty inches in height, and of hexagonal shape, with grape vines in full leaf, and rich clusters of grapes entwine its neck, illustrative of the rich receptacle of their delicious juice. On the back of the picture are two tablets, representing a landscape, embracing a cottage upon the banks of a placid stream, a bridge, and a forest in the distance. On one side another landscape, representing the rising sun, while in the foreground lie daguerreotype apparatus, seemingly ready to catch the most interesting feature of the picture, as the sun in rising throws its golden rays over the scene. On the opposite side is represented a chemical laboratory, showing that to chemistry the art is chiefly indebted. On the two front tablets are portraits of those two illustrious artists, Daguerre and Niepce, the discoverers of the beautiful art of photography. The handle is a most elaborately carved vine, with a lizard creeping to the mouth of the pitcher. The base is also elaborately carved and ornamented in the most exquisite style.

THE SECOND PRIZE, which is to be awarded to the best half plate picture taken by a half-size instrument, consists of a pair of goblets, equally beautiful in workman-

ship and tasteful in design. Both these prizes are faithfully represented by our engravings, which must give a better idea of them than any description from our pen.

— Mr. Henry Meade has gone to Europe to view the progress of the art in that country, and see what can be gleaned for the benefit of his cotemporaries. By-the-way, we had an opportunity of examining the double whole daguerreotype of the Brothers Meade—their Rembrant style—and take pleasure in saying that the taste displayed in their production, as well as their finish, is highly commendable, and marks a rapid improvement in every branch of their art.

— Our friends, Davie and Evans, of Utica, are out with a monthly publication, —“The Scientific Daguerrean”—the first number of which indicates a determination on their part to be useful to their fellow artists. “*Multum en parvo*” is their motto, and the price 50 cents per annum, brings its influence within the reach of all, to whom we recommend it cheerfully.

— STILL ANOTHER.—Mr. L. Babbitt, of Worcester, Mass. we understand has published proposals for issuing a Journal devoted to the photogenic arts—to be edited, we suppose, by his talented lady—*Sapiens dominabitur astris*.

— As we have given our readers specimens of the facetious style of our western artists, we shall now give them a dash of southern wit.

A CHAPTER ON THE DAGURREAN ART, AND ITS PROFESSORS, OF THE DOLLAR NOTORIETY.—It has been suggested that these disciples of Daguerre attach the names of sitters to their productions, that they may be more easily recognized by their friends. But as this is a matter we are not interested in, we leave it for those that are—their patrons. But would, ourselves, suggest the propriety and fairness of the

operator's name being attached, for two reasons—first, that the public may know where caricatures may be had; and, second, that they may avoid them when they wish a daguerreotype.

Another thought occurs to us: it is well known that the State finds it necessary for the better protection of its citizens, to have officers, whose duties it is to inspect grain, flour, etc., and brand their qualities. Now for the same reasons, would it not be well to have an inspector of daguerreotypes?—We think it would, and hope that the Legislature, next fall, will take this matter up, and give it that calm and serious consideration which it deserves. But as they probably will not understand this subject as well as they do that of unequal and arbitrary taxation, we will assist them, by furnishing for the purpose, a plan of a stamp or stencil plate, viz:—Taken for———by———, an experimenter in the art, cost one dollar, or fifty cents as the case may be, which would be determined by the quality of the article; and then, on the event of our plan's being accepted, we fancy we see the daguerreotypes finding their way into the prices current of the day, reported thus:

Daguerreotypes, common brand, various prices, ranging from 37½ cts. to a dollar—little or no demand. Genuine article, medium size, ready sale, and firm at three dollars. Remarks—public taste improving.

We are aware that our endeavors to hold these cadets in the art up to public gaze, that they may be seen in their true light, may, by some, be misconstrued into envy on our part, and by exciting public sympathies, increase the evil which we are trying to abate. But, however deplorable such a result would be, the task had to be performed.—For we should hold the man guilty indeed, who would sit in silence, and see the community in which he resides deluded by impostors. But our object must not be mistaken. Our intention is not to abuse, but rather to convince these mercenary operators that they have either mistaken their profession, or have most shamefully neglected to give it that attention and careful study which it requires, and by improving the public taste, force this conviction upon them.

M. P. SIMONS, 151 Main st.

"LET THE GALLED JADE WINCE." — When a slave is under the lash, his master trying to subdue a spirit of insubordination, the pain sinking deep into his soul, in a spirit of defiance he will often cry, "Oh, you don't hurt." Apply the lash, and he piteously cries for mercy. So is it with some of our daguerreotypists, for when we to accomodate a large and respectable class of our citizens, brought down the prices of our pictures, the cry was heard, "it will ruin them," "nobody will take such things," &c.; they have seen to their great mortification the gallery at 110 Main street crowded from early morn till twilight with the elite of the city; and viewing their own beggarly account of empty benches, cry out for protection by Legislative enactment. Could they produce superior pictures there would be no use for this. We are delighted with the high encomiums of praise passed upon our productions of the art, and while we continue to receive the applause of the "fair, better portion of creation" we shall be content to think, as we are sure thousands of others think, that some of our craft are small per-Simons.

MOULSON'S, 110 Main-st.

We have beautiful pictures for one dollar.

TO THE PUBLIC — We were amused to see a reply, after the style of a police report, to our chapter on the daguerrean art, and its professors of the dollar notoriety. But we could not understand why our name, or any part of it, should have appeared in this strange piece of composition; though, we suppose they thought it was required to make it acceptable to the public, and we were about giving them credit for this idea, this artifice to gain notoriety, when we glanced at the paper before us, and found that this, like everything else they do, was only half done—showing, however, what a small portion of our name is required to give character to such weak replies. Flattering as it may be to us to find our name of so much importance, we must not be bribed thus into a neglect of our duty. We must perform it, at all hazards. We have heard that our article was so very cutting, touched so many sore places, and was so well adapted to the purpose for which we intended it, that these cheap picture makers did not believe we wrote it. How-

ever if they will not allow us to write our own advertisements, they cannot deny us the pleasure of dreaming our own dreams. And though a man must be particular in what he says while awake, yet he is not altogether answerable for what takes place when asleep. Therefore, I shall relate in full, a vision I had a few evenings ago.

I thought, as it was a warm and beautiful evening, that I would take some relaxation from the fatigues of business, and I accordingly strolled forth to enjoy the fresh air; and as is usual with the disorder of dreams, I soon found myself in a strange room, among a large number of strange people.— The walls of this room I had just entered were hung with paintings, but as there was so little light there, I did not attempt to examine them. I made enquiry of several bystanders to learn the object of the gathering, but none seemed to know. I at last accosted a man near me, in a blue coat and buff vest, who, at the time, was dusting off the paintings with his handkerchief. "Sir," said I, "can you inform me of the object of this gathering?" "O yes?" said this man in a blue coat and buff vest, with a consequential air, "this be a Peter Funk auction, and I be the auctioneer." "But," I observed, "I thought that these places of imposition and fraud had been stopped by the mayor of the city," (New York). "So they were," said he, "but as long as public opinion remains as it is, such places will always exist." Well, sir," said I, "what is your opinion of this business?" "Why to tell you the truth, sir, it is out and out a grab game. Most of the articles put up here, are of no value whatever. These paintings," pointing to the ones he had just been dusting, "bring generally about one dollar. But if there is any one here from the country to-night, you will see them knocked off as high as one dollar and fifty cents." "One dollar and fifty cents!" I exclaimed, "that seems cheap; I should think the frames alone cost more money." "You are quite right," said he, "they are set in showy frames to make them sell. The mere paintings are not worth the paint that is used in painting them. We get them from Germany, where they are mechanically painted by small girls and boys, after good models, such as you see on the opposite side of the room. These paintings by the old masters, are very difficult for us to

obtain. So we have to deal altogether in the cheaper kind. But I'm afraid that our traffic in this spurious article will soon be at an end," continued the man in a blue coat and buff vest, "for there is a pretty shrewd chap in town, a dealer in the genuine article, who is enlightening the public on this subject, and exposing our tricks; and should he succeed, I will have to go back to my carpentering trade." "A very good and honorable calling," said I; "and one, I should think, much better adapted to your capacity."

By this time the bell had ceased its doleful sound, and the man with the blue coat and buff vest, with hurried, nervous step, made his way towards the desk, and the next moment, with mallet in hand, was heard, with a coarse, shrill voice, setting off the qualities of his paintings—come, gentlemen, bid lively. The paintings I put up to night must be sold, if they bring but 37½ cents, so bid lively. One dollar did I hear—one dollar I hear—one dollar, one dollar, one dollar—all done, gentlemen, at one dollar. Must I knock these beautiful paintings down at this shamefully low price. Too bad, too bad, gentlemen. What are things coming too? Those gems on the opposite side I could not furnish you for three times the money; nay, I might say three hundred times, and yet these made in imitation of them, I am only getting one dollar for. In this manner the man with blue coat and buff vest went on until he had disposed of some twenty-five or thirty of these trashy paintings. I became tired of these monotonous proceedings, and was about leaving, when my eyes fell upon a young man lighting a cigar.

He was about five feet eight inches, of good form and face, his dark, bright, and expressive eye bespoke an uncommon share of intelligence, and his dark eyebrows and dark glossy hair set off a forehead of good proportions. He was neatly attired in a suit of the finest black broadcloth, got up in a style creditable to our most fashionable tailors, such as Beers & Poindexter, Keen, Chiles & Co., or Riddick & Benson. (Now, should there be others equally as deserving the praise of making this gentleman's suit, if their names are handed to us, they shall have a place in our future dreams.) Liking the appearance of this gentleman in black, I en-

deavored to draw him into conversation. "You seem, sir, to be a stranger here, as well as myself," I observed. "If you will sit down with me, I will communicate to you some information which I have just received from the man in the blue coat and buff vest." But finding that to all this he made no reply, I addressed him again, which he noticed, and told me by motions of his fingers that he was dumb. As I understood the mutes alphabet, we soon entered into conversation. We talked upon various topics, among others that of paintings, but upon the fine arts I soon found that my friend in black was but ill informed. He preferred the paintings which the man in a blue coat and buff vest was selling, to those rich spirited gems of the old masters hanging around us. I tried to correct his bad taste. I told him that the paintings he saw selling for a dollar, were very indifferent, and not worth carrying home. "Observe," said I, "the art of the man in the blue coat and buff vest. See with what dexterity he holds up the daubs higher and higher, as the spectator approaches to examine them."

To this he merely nodded his head, and appeared anxious to change the subject of conversation, which he did by asking me my profession. I observed that I was a farmer, for a man is not expected to remember his profession when asleep. It is a very independent life, said he, and I suppose you enjoy the luxuries of a fruit garden. To this I nodded in the affirmative—taking at the same time from my large farming coat pocket, some choice specimens of fruits of various kinds. But I noticed that my friend in black partook freely of all except the persimmons. I asked him the reason of this strange taste. He said they did not agree with him. They were too sharp for his pallet. I observed that in moderation, they were quite harmless. Suppose you try but one. "I tell you that I am afraid of them," he replied coolly. "It has not been long since I tried one, which, I am afraid, will throw me into a decline." Seeing that I could not prevail upon my friend in black to taste of this delicious fruit, I placed them back again into my pocket. I now felt a curiosity to learn the profession of my friend in black, and made motions with my fingers to that effect. To which he replied,

"I am a preacher." This startling information almost awoke me. Alas, if it had, for the best part of a dream is generally left for the last. What a strange profession for a dumb man, thought I. "A preacher," I observed. "How under the sun do you make out to preach, and you dumb?" "Ah!" said he, "my hearers are as dumb as myself, and we all go through the dumb motions together." At this time, my attention was drawn to the other side of the room, where I thought I saw the purchasers of these cheap paintings arranging them on the wall, in some sort of regularity, which I took to be letters. And just as they had finished the last word, I saw a dart of fire shoot from an opposite painting—I think, a battle piece by Reubens—setting fire in an instant to the varnish on these cheap paintings, and in a flash, quick as thought, the following words blazed forth—PUBLIC TASTE IMPROVED.—It was the most imposing sight I ever saw. Every eye in the room was turned towards the works of art on the opposite side, for they were now beautifully lit up by the burning of these letters, which grew brighter and brighter still, until the sentence—PUBLIC TASTE IMPROVED—could be read by a child. While all this was going on, my friend in black was resting his head on his hand. I nudged him and said, as the light of the room was so brilliant, we could now examine, with pleasure, the beautiful paintings of the old masters. What is it? Where am I? He had been dreaming too, I suppose. I pointed to the burning letters on the wall. He looked up, and no sooner did the words of fire catch his eye, than he turned pale and staggered, and in my efforts to catch him, I fell out of bed.

M. P. SIMONS.

TRANSPARENT PROOFS OBTAINED DIRECTLY
FROM THE DARK CAMERA.

M. Cosmo of Cossio, is the author of a process which has furnished him with very curious results. He obtained transparent proofs upon glass. In regard to their transparency they have a great finish of detail and outline. This is his process:

He covers the plate of glass with a film of collodion that he makes by the ioduret of potash and from the milk of silver, instead of the nitrate; he then makes the

image appear by means of the pyrogallic acid. At the time that it develops itself, he submits it to the action of a mixture of ammonia and azotic acid, then he fixes it without the hyposulphite.

In this last bath the film of collodion becomes perfectly insoluble, and so hard that it is almost impossible to take it from the glass.

The employment of this process seems very important for obtaining stereoscopic proofs. However, they have another application which is not without interest. We can color them in oil, and thus obtain very satisfactory effects.

COLLODION OF M. BERTSCH.

I have made numerous trials with this collodion which has already enjoyed a certain renown. It is a fine preparation which ought to eclipse the English collodion. I recommend it for its extreme sensibility and have with success obtained positive and negative proofs of great purity; but for that I have been obliged to add some acetic acid to the nitrate of silver. Without this precaution, the proofs which I obtain are almost always covered with a general veil or specks.

This effect slightly sensible upon negative proofs which are always drawn upon a grey ground, is incompatible with the production of positive proofs which are destitute of the black and designed with difficulty.

Every one can be able in a manner to make trial; we would remark that the proofs will become more and more pure in proportion as the acetic acid increases, without which the sensibility is slightly diminished. I have even succeeded by pouring over it some acetic acid and some drops of concentrated nitric acid.

I have been, like many others surprised at the high price of collodion; but, in using it, I can recommend it to an advantage which will make a difference in this respect. This collodion is of a remarkably fluid nature, it appears to contain a great quantity of alcohol for it easily dries, and does not cool upon the plates like the collodion; it leaves a film so slight that we are surprised at the considerable number of plates which holds it, which one flask suffices to cover. In a word, one-half of this collodion is necessary to produce the same

effect of that which is thicker which sells for one half.

The pellicle of ioduret of silver appears to embody itself with the collodion; upon 30 or 40 proofs which I have made with silver plate baths, I have never seen it detach itself from any point.

I seize this occasion to give an eulogium upon an excellent production which will be precious to the photographer, but I uphold the necessity of using some acetic acid in the nitrate of silver, for it is not my flask which has by necessity been employed, but I have known the same difficulty to occur to M. Lerebours, and other operators have become much discontented, not knowing this fact, which is altogether contrary to the prescriptions of the inventor. This is the reason that the direct positive proofs, such as I have obtained are yet unknown; these proofs can only be obtained, as the blacks are destitute of all deposits of salts of silver which pass unperceived upon the intense negative proofs, proper to give good positive proofs.—M. A. GAUDIN. *La Lumiere.*

— As it must be interesting to our readers in this country to hear of the success of their countrymen resident in foreign countries we make the following extracts from the *Liverpool Mail* and *London Athenæum*:

No visitor to London should omit paying a visit to the daguerreotype galleries of M. Mayall in the Strand and Regent-street; for this gentleman's productions in the art of portraiture possess features of peculiar novelty and excellence which make them unusually attractive and interesting. In the first place, some of his pictures are the largest ever taken, many of them being the size of ordinary prints such as are hung in drawing-rooms; while other expressive scenes of domestic interest are familiar to the public by lithographs which have been taken from them. His views of the Great Exhibition and different English and American landscapes are also the largest and finest ever made permanently visible by this new science, and all, notwithstanding their novel size, are clear and in perfect drawing. Those who love to gaze on the features of their fellow-creatures—great in arts, science, or literature

—will have a rare pleasure in viewing Mr. Mayall's life-like series of portraits. The theatrical amateur will recognize with pleasure the well known forms of Buckstone, Wright, Webster, Celeste, Miss Woolgar, and other great stars in the dramatic firmament; while the lover of literature will gaze with interest on the wierd-like features of Sir Edward Lytton Bulwer, the masculine *personnel* of Eliza Cooke, and other authors of talent and fame in the various walks of literature. Mr. Mayall possesses also the likenesses of the great London physicians and surgeons; most of the leading officials of the Great Exhibition; Mr. Hobbs, the locksmith; Col. Colt, of revolver notoriety; Louis Napoleon, of political notoriety; Joseph Hume, of radical notoriety; and numerous other persons and scenes interesting for various reasons to every spectator. In fact a more agreeable lounge does not exist in the metropolis, while the polite attention of Mr. Mayall and his assistants are equally afforded to all classes—be they customers or mere spectators.

Mr. MAYALL, the eminent daguerreotypist—whose activity lets slip no opportunity of testing the utmost magical power of his art—took advantage of the paragraph in our columns last week which called attention to the balloon ascent of Tuesday, and the objects for which it was undertaken, to secure for himself another triumph. While the scientific men who compose the Kew Committee of the Council of the British Association, and the observers whom they had commissioned, were busy about the preparations for the ascent, he set up his instrument in the gardens, and fixed the group by the pencil of that sun towards which a portion of them were about to travel, in a manner which will form an admirable pictorial commemoration of the first voyage to the upper air formally undertaken in this country so far as we know, by science in the carriage of her own creation. As he was indebted for the opportunity to ourselves, he has sent the result for our inspection;—and really, whether as a picture, or as a set of likenesses, it is extraordinary. The group is backed by the trees of the garden, whose foliage is caught with the lights, and almost it would seem with the air, wandering amongst it. In the

centre stands Col. Sabine,—with Col. Sykes on his right hand, and Mr. Gassiot on his left.—The figure to the extreme right of the picture is Dr. Miller, and that to the extreme left, Mr. Welsh, one of the observers. The gentleman between Mr. Welsh and Col. Sykes we do not know,—but suppose it to be the other of the two observers,—Mr. Nicklin. The faces and figures are a group of individualities, and the laboratory details in front are made out with curious precision. We suppose Mr. Mayall intends the picture for publication, in some form.

— We would call the attention of our readers to the advertisement of Mr. Bishop, on our cover, also, to that of Mr. Gurney.

— In order to stimulate the ambition of the daguerrean artists of our country to literary exertion on the subject of their art, we have concluded to offer a prize of a GOLD MEDAL for the best dissertation on the DAGUERREAN ART as practised in the United States ; the length of the article to be not less than twenty pages of the Photographic Art-Journal.

We will also give a GOLD MEDAL for the best original PRACTICAL TREATISE on the daguerreotype. And a third for the best article on THE VALUE OF THE PHOTOGRAPHIC ART AS COMPARED WITH THE FINE ARTS GENERALLY.

All to be sent to the editor of the Photographic Art-Journal on or before the 1st of March, 1853. The authors name must be enclosed in a separate sealed envelop. The editor reserving the privilege of returning or publishing the unsuccessful papers.

PREMIUM FOR THE BEST DAGUERREOTYPE.—One year since I offered a reward of *five hundred dollars* for the greatest improvement that should be made in the Photographic art during the year 1851. No applications of any importance were made for it, probably in consequence of the natural modesty of inventors. Inasmuch,

however, as the money has been offered, I consider that it no longer belongs to myself but to the Art. Therefore, with the advice and consent of Professor Renwick, Morse and Draper, who were appointed the judges in the matter. I have decided to invest the above amount in a MASSIVE SILVER PITCHER, of appropriate design, to be awarded as a prize for THE BEST FOUR DAGUERREOTYPES that shall be offered for competition previous to November 1st, 1853.

No competitor will be allowed to exhibit more than one Daguerreotype of each size.

The Daguerreotypes offered for competition must be on what is called the full, two-third, half and quarter sizes.

After the decision of the judges the pictures will again become the property of the artists who made them, and be returned as may be directed.

A description of the method of operating in the production of the picture offered, must accompany each picture, mentioning the brand of plate and the makers of the various chemicals used, as far as the operator may be able to tell.

In order that there may be no complaint as to partiality, the pictures must be sent anonymously, accompanied by a sealed package containing the name of the artist and the method of operating. The pictures and sealed envelopes will be marked with corresponding numbers in the order of their reception, and the latter will only be opened after the decision of the judges.

As this prize is offered as a test of the skill of manipulators and not the excellence of the camera, no instrument larger than the regular full size must be used. Daguerreotypes taken by the mammoth camera will be excluded.

Artists of all countries are invited to send pictures for competition.

All letters of enquiry upon the subject will receive prompt attention, and it is earnestly hoped the competition will be as spirited as possible.

All who intend to compete for the prize should send in their names as early as possible, as lists of the competitors will from time to time be published.

The pictures must be forwarded to my address, free of expense.

E. ANTHONY.

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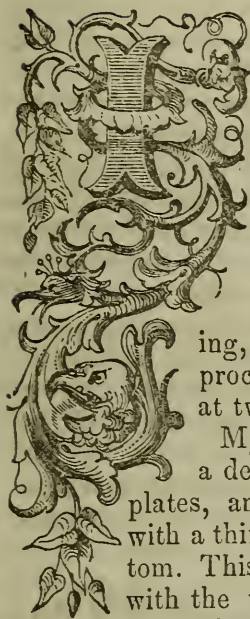
PHOTOGRAPHY.*

BY ROBERT HUNT.

PROFESSOR OF MECHANICAL SCIENCE IN THE MUSEUM OF PRACTICAL GEOLOGY,

AUTHOR OF

"RESEARCHES ON LIGHT," "THE POETRY OF SCIENCE," ETC.



was soon satisfied that all the arrangements might be much simplified, and any one may have constructed for himself for less than twenty shillings a set of apparatus, by which he shall be enabled to produce pictures equaling, in every respect, those procured with the set sold at twenty pounds.

My apparatus consists of a deal box the size of my plates, and three inches deep, with a thin loose board in the bottom. This board is well saturated with the tincture of iodine; the spirit is allowed partially to evaporate, and then, being put in its place, the plate is adjusted at a proper height above it, varying the height according to the temperature,—the box being closed, the operation is completed in about three minutes. Another deal box, having a glass in one side, and a bottom of sheet iron, which is slightly concaved to contain mercury, with grooves upon which the plate may rest at the proper angles, serves to mercurialize the plates. My camera, which I use for every photographic process, is described in a future chapter. It is sometimes convenient, particularly when traveling, to use a piece of amalgamated copper, which may be prepared, when wanted, by

rubbing it with some nitrate of mercury. The expense of the plates may be very much reduced: instead of using copper *plated* with silver, I would recommend the use of silvered copper, which every one can prepare for himself at a very small expense. The following is the best method of proceeding:—

Procure a well planished copper plate of the required size, and well polish it, first with rotten stone and water, then with snake stone, and bring it up to a mirror surface with either rotten-stone or jewelers' rouge. Plates can be purchased in a high state of preparation from the engravers. Having prepared the copper plate, well rub it with salt and water, and then with the silvering powder. No kind answers better than that used by clock-makers to silver their dial-plates. It is composed of one part of well washed chloride of silver, five parts of cream of tartar, and four parts of table salt. This powder must be kept in a dark vessel, and in a dry place. For a plate six inches by five, as much of this composition as can be taken up on a shilling is sufficient. It is to be laid in the centre of the copper, and the fingers being wetted, to be quickly rubbed over every part of the plate, adding occasionally a little damp salt. The copper being covered with the silvering, it is to be speedily well washed in water, in which a little soda is dissolved, and as soon as the surface is of a fine silvery whiteness it is to be dried with a very clean warm cloth. In this state the plates may be kept for use. The first process is to expose the plate to the heat of a spirit

* Continued from page 276, Vol. 4, No. 5.

flame, until the silvered surface becomes of a well-defined golden-yellow color; then when the plate is cold, take a piece of cotton, dipped in very dilute nitric acid, and rub lightly over it until the white hue is restored, and dry it with very soft clean cloths. A weak solution of the hydriodate of potash, in which a small portion of iodine is dissolved, is now passed over the plate with a wide camel's hair brush. The silver is thus converted, over its surface, into an ioduret of silver; and in this state it is exposed to light, which blackens it. When dry, it is to be again polished, either with dilute acid, or a solution of carbonate of soda, and afterwards with dry cotton, and the smallest possible portion of prepared chalk: by this means a surface of the highest polish is produced. The *rationale* of this process is in the first place, the heat applied drives off any adhering acid, and effects more perfect union between the copper and silver, so as to enable it to bear the subsequent processes. The first yellow surface appears to be an oxide of silver, with, possibly, a minute quantity of copper in combination, which being removed leave a surface chemically pure. Copper plates may also be very beautifully silvered by galvanic agency, by which we are enabled to increase the thickness of the silver to any extent, and the necessity for the heating process is removed, the silver being absolutely pure. The best and simplest mode with which I am acquainted is to divide an earthenware vessel with a diaphragm: one side should be filled with a very dilute solution of sulphuric acid, and the other with either a solution of ferropotash, or muriate of soda, saturated with chloride of silver. The copper plate, varnished on one side, is united, by means of a copper wire, with a plate of zinc. The zinc plate being immersed in the acid, and the copper in the salt, a weak electric current is generated, which precipitates the silver in a very uniform manner over the entire surface.

At a very early stage of my inquiries I found that the influence of all the rays, excepting the yellow, was to loosen the adhesion of the iodated surface, and the under layer of unaffected silver. When this changed film was removed by rubbing, the silver beneath always exhibited the most perfect lustre, and I have hence invariably

adopted the mode of polishing my daguerreotype plates. The required surface is thus produced with one-third the labor, and a very great saving of time; besides which, the silver is in a much more susceptible state for receiving the vapor of the iodine. The plate being thus prepared, we proceed in the manner before directed.

It is somewhat singular that on the first notice of Daguerre's pictures, long before the publication of his process, when I learnt that they were on "hard polished tablets," I entertained the idea that plates of copper thus silvered were oxidized and then acted on by iodine. I applied the iodine, both in solution and vapor; but, of course, as the mercury was not used, I failed to effect any perfect pictures. It is, however, worthy of remark, that on one occasion, having placed a piece of silvered copper in a trough containing a weak solution of iodine, with some leaves of hemlock superimposed, these being kept close by means of a piece of glass, over all the exposed portions the silver was completely removed, and the copper abraded to a considerable extent, while beneath the leaves the silver was scarcely affected. I thus procured a very beautiful etching, the figures being in high relief. This was frequently repeated with success; but other inquiries having drawn off my attention, the process has been long neglected, although I am convinced it is capable of being turned to much useful account.

In November 1839, I pursued a series of experiments with bromine, but no very definite advantage was obtained. Some curious effects which I noticed at that time are worthy of notice. I copy the remarks made in my memorandum-book at the time.

4. Exposed a plate to the vapor of bromine; it assumed a leaden-gray color, which blackened by light very readily. Exposed this to mercury with much improving the effect or altering the lights. Upon immersing this plate in a solution of the muriate of soda, the parts unacted on by light became a jet of black, whilst the parts on which light had acted were dissolved off, leaving a clean coating of silver. The effect was most decisive—a *black picture on a white ground*.

8. Allowed three plates to assume—the first to a straw-yellow, the second a steel-blue, and the third a dull blue, and exam-

ined their sensitiveness; the plate which had arrived at the dull blue color appeared to be the most sensitive.

These experiments, which were then pursued with a view to produce more permanent pictures—to fix the mercury—or to engrave the plate, were, however, abandoned, and have not yet been resumed, although I hope in a little time to turn my attention again to this point. On one occasion, after having prepared a picture according to the process prescribed by Daguerre, I placed it, without removing the iodine, in a vessel of chlorine; the picture was obliterated, and very speedily blackened. On exposing this black plate to light, it almost instantaneously whitened. This is mentioned to show the extent of curious subjects which photography is opening for inquiry in the hope they may induce some person to pursue the subject.

It was announced that the inventor of the daguerreotype had succeeded in improving the sensibility of his plates to such an extent as to render an instantaneous exposure sufficient for the production of the best effects; consequently, securing faithful impressions of moving objects. In a communication with which I was favored from M. Daguerre, he said,—“Though the principle of my new discovery is certain, I am determined not to publish it before I have succeeded in making the execution of it as easy to everybody as it is to myself. I have announced it immediately at the Royal Academy of Paris, merely to take date, and to ascertain my right to the priority of the invention. By means of that new process, it shall be possible to fix the images of objects in motion, such as public ceremonies, market places, covered with people, cattle, &c.—the effect being instantaneous.”

In 1844, M. Daguerre, in a letter to M. Arago, published this process; but it proved so complex in its manipulatory details, and so very uncertain, that it has not been adopted. As it is, however, curious, it is thought advisable to include it within this volume. We quote from the *Comptes Rendus* for April 1844:—

“You have been kind enough to announce to the Academy that I had arrived by a series of experiments, at recognising in a certain manner that, in the present state of my process, the layer sensible to

light being too thin, could not furnish all the gradation of tints necessary for reproducing nature with relief and firmness; indeed, although the proofs hitherto obtained are not deficient in purity, they leave, with a few exceptions, much to be desired with relation to general effect and relief.*

It is by superposing on the plate several metals, reducing them to powder by friction, and by acidulating the empty spaces which the molecules leave, that I have been enabled to develop galvanic actions which permit the employment of a much thicker layer of iodide, without having to fear, during the operation of light in the camera-obscura, the influence of the liberated iodine.

The new combination which I employ, and which is composed of several metallic iodides has the advantage of giving a sensible layer capable of receiving impressions simultaneously by all the degrees of tone and I thus obtain in a very short space of time, the representation of objects vividly enlightened with demi-tints, all of which retain, as in nature, their transparency and their relative value.

By adding gold to the metals which I first used, I am enabled to avoid the great difficulty which the use of bromine, as an accelerating substance, presented. It is known that only very experienced persons could employ bromine with success, and that they were able to obtain the maximum of sensibility only by chance, since it is impossible to determine this point very precisely and since immediately beyond it the bromine attacks the silver, and is opposed to the formation of the image.†

With my new means, the layer of iodine is always saturated with bromine, since the plate may, without inconvenience, be left exposed to the vapor of this substance for

* On the plate cleaned by means of the layer of water, as I have pointed out, very fine impressions are very rapidly obtained, but which are also wanting in relief, on account of the thinness of the sensible layer.

† Every one knows that the dry vapor of bromine is more favorable than that which is obtained by means of a solution of bromine in water: for the latter has the inconvenience of carrying with it moisture which condenses on the surface of the plate. The employment of the oil, which I indicate further on, neutralizes this effect, and gives to the vapor of bromine diluted with water the same property as that of dry bromine.

at least half the necessary time; for the application of the layer of gold is opposed to the formation of what is called the veil of bromine. This facility must not, however, be abused; for the layer of gold, being very thin, might be attacked, especially if too much polished.* The process I am about to give may, perhaps, be found rather complicated; but, notwithstanding my desire to simplify it as much as possible, I have been led, on the contrary, by the results of my experiment, to multiply the substances employed, all of which play an important part in the whole process. I regard them all as necessary for obtaining a complete result, which must be the case, since I have only gradually arrived at discovering the properties of these different metals, one of which aids in promptitude, the other in the vigor of the impression, &c.†

From the concurrence of these substances arises a power which neutralizes all the unknown effects which so often oppose the formation of the image.‡

I think, besides, that Science and Art should not be interrupted by the consideration of a more or less long manipulation; we should be contented to obtain beautiful results at this price, especially when the means of execution are easy.

The galvanic preparation of the plate does not present any difficulty. The operation is divided into two principal parts: first, which is the longest, may be made a long time previously, and may be regarded as the completion of the manufacture of the plate. This operation, being once made, serves indefinitely; and without recommencing it, a great number of impressions may be made on the same plate.

DESIGNATION OF THE NEW SUBSTANCES.

Aqueous solution of bichloride of mercury:
Solution of cyanide of mercury :

* This is so true, that if an impression be made on a plate which has been fixed several times, it may be exposed to the vapor of bromine as many times more than the necessary time it has received layers of gold.

† I will only observe, that the employment of all the metals which I indicate further on is indispensable; but the mode of applying them may be varied.

‡ For, by multiplying these elements as in a pile, this power is augmented, and we are thus enabled to make the most indolent radiations act in the same time; such as those of green and red.

White oil of petroleum, acidulated with nitric acid :

Solution of chloride of gold and platinum.

PREPARATION OF THE SUBSTANCES.

AQUEOUS SOLUTION OF BICHLORIDE OF MERCURY.—8 grains of bichloride of mercury in 10,000 grains of distilled water.

SOLUTION OF CYANIDE OF MERCURY.—A flask of distilled water is saturated with cyanide of mercury, and a certain quantity is decanted, which is diluted with an equal quantity of distilled water.

ACIDULATED WHITE OIL OF PETROLEUM*—This oil is acidulated by mixing it with one-tenth of pure nitric acid, leaving it for at least 48 hours, occasionally agitating the flask. This oil, which is acidulated, and which then powerfully reddens litmus paper, is decanted. It is also a little colored, but remains very limpid.

SOLUTION OF CHLORIDE OF GOLD AND PLATINUM.—In order not to multiply the solutions, I take the ordinary chloride of gold used for fixing the impressions, and which is composed of one gramme of gold, and 50 grains of hyposulphate of soda, to a quart of distilled water.

With respect to chloride of platinum, 4 grains must be distilled in three quarts of distilled water; these two solutions are mixed in equal quantities.

MODUS OPERANDI.

First Preparation of the Plate.

Note.—For the sake of brevity in the following description, I will abridge the name of each substance. Thus, I will say to designate the aqueous solution of bichloride of mercury, *sublimite*; for the solution of cyanide, *cyanide*; for the acidulated oil of petroleum, *oil*; for the solution

* The most suitable oil of petroleum is of a greenish yellow tint, and taken at different angles azure reflections.

I have given the preference to this oil over the fixed oils, because it always remains limpid although strongly acidulated. My object in employing an acidulated oil is to reduce the metals to powder, and to retain this powder on the surface of the plate, at the same time giving greater thickness to the layer by its unctuous properties; for the naphtha which results from the distillation of this oil does not produce the same effect, because, being too fluid, it carries away the powder of the metals. It is for the same reason that I have lately recommended the employment of essence of lavender rather than that of essence of turpentine.

of chloride of gold and platinum, *gold and platinum*; and for the oxide of iron, *rouge* only.

The plate is first polished with sublimate and tripoli, and afterwards with rouge,* until a beautiful black is arrived at. Then, the plate is laid on the horizontal plate, and the solution of cyanide is poured on it and heated over a lamp, as in fixing an impression with chloride of gold. The mercury is deposited, and forms a whitish layer. The plate is allowed to cool a little, and, after having poured off the liquid, it is dried by rubbing with cotton and sprinkling with rouge.

It is now necessary to polish the whitish layer deposited by the mercury. With a piece of cotton steeped in oil and rouge, this layer is rubbed until it becomes of a fine black. In the last place, it may be rubbed very strongly, but with cotton alone, in order to render the acidulated layer as thin as possible.

The plate is afterwards placed on the horizontal plane, and the solution of gold and platinum is poured on. It is heated in the ordinary manner; it is then allowed to cool, the liquid is poured off, and it is dried by gentle friction with cotton and rouge.

This operation must be performed with care, especially when the impression is not immediately continued; for, otherwise, some lines of liquid would be left on the plate, which it is difficult to get rid of. After this last friction the plates should be only dried, and not polished.

This concludes the first preparation of the plate, which may be made a long time previously.

Second Preparation.

Note.—I do not think it fit to allow a longer interval than twelve hours to intervene between this operation and iodising the plate.

* If I prefer for polishing, rouge to other substances it is not because I recognize in it a photogenic property, but because it burnishes better, and because it assists in fixing the layer of gold, rendering it less susceptible of being removed in scales when heated too much. The galvanic plates, when there are neither marbles nor black stains, (which sometimes happened originally), receive better than others the application of metals, and, consequently, the chloride of gold adhering to it more firmly is not removed in scales.

We left the plate with a deposit of gold and platinum. In order to polish this metallic layer, the plate is rubbed with a piece of cotton, and oil and rouge, until it again becomes black; and then with alcohol and cotton only, in order to remove this layer of rouge as much as possible.

The plate is then rubbed very strongly, and passing several times over the same places, with cotton impregnated with cyanide. As this layer dries very promptly, it might leave on the plate traces of inequality; in order to avoid this, the cyanide must be again passed over it, and while the plate is still moist, we quickly rub over the whole surface of the plate with cotton imbibed with a little oil, thus mixing these two substances; then, with a piece of dry cotton, we rub in order to unite, and, at the same time, to dry the plate, taking care to remove from the cotton the parts which are moistened with cyanide and oil. Finally, as the cotton still leaves traces, the plate is likewise sprinkled with a little rouge, which is removed by gentle rubbing.

Afterwards, the plate is again rubbed with cotton impregnated with oil, only in such a manner as to make the burnish of the metal return; it is then sprinkled with rouge, and then very gently rubbed round in such a manner as to remove all the rouge, which carries with it the superabundance of the acidulated layer.*

Finally it is strongly rubbed with a rather firm pledget of cotton, in order to give the last polish.†

It is not often necessary to renew the pledgets of cotton imbibed with oil and rouge; they must only be kept free from dust. I have said above that the first preparation of the plate may serve indefinitely; but it will be comprehended that the second must be modified, according to whether we operate on a plate which has received a fixed or an unfixed impression.

* This must be done as gently as possible; for otherwise the rouge would adhere to the plate and would form a general film.

† In operating on a plate a long time after it has received the first preparation, it is necessary, before employing the acidulating oil and red oxide, to operate as I indicate further on, for the plate which has received a fixed impression. This precaution is necessary for destroying the stains which time may have developed.

On the Fixed Impression.

The stains left by the washing water must be removed with rouge and water slightly acidulated with nitric acid (at 36° Fah. at this season [April?]) and less in summer.)

Afterwards the plate must be polished with oil and rouge, in order to remove all traces of the image.

The operation is then continued as I have just described for the second preparation of the new plate, and beginning with the employment of alcohol.

On the Unfixed Impression (but whose Sensible Layer has been removed in the ordinary manner.

First, the plate must be rubbed with alcohol and rouge, in order to remove the traces of oil which serves for receiving the foregoing impression.

We afterwards proceed as indicated above for the new plate, beginning with the employment of alcohol.

SUMMARY OF THE OPERATIONS.

First Preparation.

1. Corrosive sublimate, with tripoli first, and rouge afterwards, in order to polish the plate :
2. Cyanide of mercury, heated and dried with cotton and rouge ;
3. Acidulated oil, with rouge for polishing the layer of mercury :
4. Gold and platinum, heated and dried with cotton and rouge.

Second Preparation.

5. Acidulated oil, with rouge, for polishing the layer of gold and platinum :
6. Absolute alcohol, for removing, as much as possible, the oil and rouge :
7. Cyanide of mercury, employed cold, and rubbed only with cotton :
8. Oil rubbed very strongly, and equalized in the last place with rouge sprinkled on it.

On the Fixed Proof.

1. Nitric acid at 36° F. with rouge for removing the stains :
 2. Oil with rouge for removing the traces of the image and for polishing.
- Continue then as above, setting out from No. 6, alcohol, &c.

On the Unfixed Proof.

Alcohol with rouge for removing the traces of oil, and continuing as above, beginning from No. 6, alcohol, &c.

OBSERVATIONS.

ON IODISING.—The color of the impression depends on the tint given to the metallic iodide ; it may, therefore, be varied at will. However, I have found the violet rose color most suitable.

For transmitting the iodine to the plate, the sheet of cardboard may be replaced by an earthenware plate deprived of enamel. The iodine transmitted by this means is not decomposed. It is useless, I may even say injurious, to heat the plate before exposing it to the vapor of iodine.

WASHING WITH HYPOSULPHITE OF SODA.—In order to remove the sensible layer, the solution of hyposulphite of soda, must not be too strong because it destroys the sharpness of the impression. 60 grammes of hyposulphite are sufficient for 1 quart of distilled water.

CHAPTER XIII.

ON THE APPLICATION OF THE DAGUERREO-TYPE TO PAPER.

THE expense and inconvenience of metallic tablets rendered it in the highest degree desirable that paper should be employed in their place. A very extensive series of experiments at length led to the pleasing conclusion of being enabled to prepare a paper which answered in every respect as well as the silver plates, and in many much better.

This discovery formed the subject of a communication to the Royal Society, which that learned body did me the honor to print in their Transactions. My memoir is entitled,—“*On the influence of Iodine in rendering several Argentine Compounds, spread on Paper, sensitive to Light, and on a new method of producing, with greater distinctness the Photographic image.*” This paper contains the substance of the following remarks ; but since the publication of the Transactions I have been successful in simplifying the process of preparation.

My experiments established, in the most satisfactory manner that even on the silver tablets a semi-oxidized surface was presented to the iodine. They also proved that perfectly pure untarnished silver was by no means readily acted on by the iodine. From this I was led to prepare oxides of silver in many different ways, which en-

abled me to spread them over paper, and the result was instructive. Any of the ordinary photographic papers allowed to darken to a full brown, which is a stage of induced oxidation, become by long exposure to iodine, of a steel-blue, or violet color. If exposed in this state to sunshine for a long period, their color changes from gray to a clear olive. Now, exposure to sunshine for a minute, or to diffused daylight for five minutes, produces no apparent change; but mercurial vapor speedily attacks the portions which have been exposed to light, and a faithful picture is given of whatever may have been superposed. There is, however, a want of sufficient contrast, between the lights and shadows. By allowing the first darkening to proceed, until the paper acquires the olive color, which indicates the formation of a true oxide of silver, it will be found, although it is not more speedily acted on by the iodine, that it is more sensitive, and that a better picture is formed. The kind of photographic preparations used appears to have but little influence on the results, —a chloride, iodide, or bromide of silver, allowed to darken, answers equally well.

There are many things, unfortunately, which prevent our availing ourselves of this easy method of producing a tolerably sensitive daguerreotype paper. These are, certain irregular formations of oxides in different states, and the revival of metallic silver in some parts of the surface.

I next spread papers with the pure oxide formed by chemical means, and also the protoxide, and many of its salts. These papers were not very readily affected by iodine, or influenced by light during short exposures.

Silver is revived from its solutions by hydrogen gas; consequently, nothing is more easy than, by washing a paper with nitrate of silver in solution, to procure a fine silver paper, by passing a current of hydrogen gas over it.

A picture of a peculiarly delicate character may be produced on this kind of paper; but it has not the required sensibility, and there is a great want of contrast in the lights and shadows. It may be interesting to state, that the yellow-brown phosphate of silver is as readily acted on by iodine as the oxides, and is quite as sensitive to luminous influence. Phosphu-

retted hydrogen gas effects the revival of metallic silver, and the surface produced by means of this gas, used as the hydrogen was in the former case, is of a fine steel-blue, which color arises from a portion of phosphorus having entered into combination with the silver. These kinds of paper comported themselves in every respect as the metallic tablets—were equally sensitive, and produced pictures as delicately beautiful. Unfortunately, however, owing to the spontaneously inflammable nature of the phosphuretted hydrogen gas, it is not safe to operate with it. After various ineffectual contrivances to overcome this difficulty, I was obliged to abandon the use of this gas entirely—warned of the danger I incurred, by several violent but fortunately harmless explosions. The vapor of phosphorus and of sulphur was also tried, and many very beautiful effects were produced. At length, however, I stopped at sulphuretted hydrogen, which answers in every respect.*

To prepare this, soak a paper of very fine texture, not too much glazed, in a weak solution of the muriate of ammonia. It must then be wiped with clean cloths and carefully dried. The paper is then dipped into a weak solution of the nitrate of silver, and the small bubbles which form on its surface are carefully removed with a camel's hair pencil. When the paper is nearly but not quite dry, it must be exposed in a closed vessel to sulphuretted hydrogen gas, slowly formed from the sulphuret of antimony and hydrochloric acid; in a few minutes it will become of an iron-brown color, having a fine metallic lustre. It is again to be passed through a solution of silver, somewhat stronger than the first, and dried, taking care that no shadow falls on the paper whilst it is drying. It is then a second time submitted to sulphuration, and by careful management, the process is now generally completed. If, however, the paper is not considered to be sufficiently dark, it must be once more washed in the solution of silver, and again subjected to the action of sulphuretted hydrogen.

If the above paper be allowed to remain

* A very interesting account of the revival of gold and silver from their solution by these gases will be found in a tract on Combustion, published by Mrs. Fulham.

in the sulphuretted hydrogen gas after the maximum blackness is produced, it is again whitened with some quickness. This may be accounted for in two ways; the gas may be mixed with a portion of muriatic acid vapor, or a quantity of chlorine sufficient to produce this effect may be liberated from the preparation on the paper to react on the sulphuret of silver.

The perfection of these papers consists in having a deep black ground to contrast with the mercurial deposit, by which means the pictures have the advantage of being seen equally well in all positions, whereas Daguerre's pictures on the metal plates can only be seen to advantage at certain angles.

The sulphuretted paper may be rendered sensitive in the same manner as the plates by exposure to the vapor of iodine. I, however, prefer drawing the paper over a solution thus formed:—A saturated solution of any hydriodic salt is made to dissolve as much iodine as possible, and of this liquid two drachms are mingled with four ounces of water. Care is required that one side only of the paper is wetted, which is by no means difficult to effect, the fluid is so greedily absorbed by it; all that is necessary being a broad shallow vessel to allow of the paper touching the fluid to its full width, and that it be drawn over it with a slow steady movement. When thus wetted, it is to be quickly dried by a warm, but not too bright fire; of course daylight must be carefully excluded. Papers thus iodidated do not lose their sensitiveness for many days if carefully kept from light.

On examining the sheet, after the daguerreotype processes in the camera, and of mercurialization, have been completed, a very perfect picture is found upon it; but it is still capable of vast improvement, which is, by the following simple plan, accomplished in a way which is at once magical and beautiful.

Dip one of the daguerreotype pictures, formed on the sulphuretted paper, in a solution of corrosive sublimate; the drawing instantly disappears, but after a few minutes it is seen unfolding itself, and gradually becoming far more distinct than it was before; delicate lines, before invisible, or barely seen, are now distinctly marked, and a rare and singular perfection of detail

given to the drawing. It may appear, at first sight, that the bichloride of mercury dissolves off the metal, and again deposits it in the form of chloride (calomel.) But this does not account for the fact, that if the paper has been prepared with the nitrate of silver, the mercury disappears, and the drawing vanishes, the deposit taking place only on those parts upon which light has acted but feebly; as, for instance, on the venations of leaves, leaving those portions of surface which were exposed to full luminous influence without a particle of quicksilver. When the paper has been either a chloride or iodide, the effect is as above, the thickness of the deposit is as the intensity of the light has been; consequently, the semi-tints are beautifully preserved. If the drawing remains too long in the solution, the precipitate adheres to the dark parts and destroys the effect. The singularity of this operation will be more striking if the picture has been soaked some time in the solution of the hyposulphite of soda, and then dipped into the bichloride of mercury. As the drawing disappears, a series of circles, formed of a white powder, appear to arise from the paper, generally commencing at the centre, and slowly extending over the whole surface: the powder is afterwards deposited, and the sheet is buried in the precipitate; but on taking the paper from the liquid, and passing a stream of water over it, the precipitate is entirely removed from all the parts except the lights of the picture. I have also found the invisible photographic image become evident, without the aid of mercurial vapor, by simply soaking for some time in a solution of corrosive sublimate.

When these papers are prepared with due care, they are extremely sensitive, and if used for copying engravings during bright sunshine, the effect is *instantaneous*. The great difficulty is to present the paper to the sun and withdraw it with sufficient celerity. In the weak light of the camera a few minutes during sunshine is quite sufficient for the production of the best effects. One great advantage of these pictures over those procured on the plated copper is, that the mercury does not lie loosely as on the tablets, but is firmly fixed, being absorbed by the paper; therefore these pictures may be kept without injury in a portfolio.

If, instead of immersing the paper in a vessel full of sulphuretted hydrogen gas, a stream of the gas is made to play upon it, it assumes a most richly iridescent surface; the various colors are of different degrees of sensibility, but for surface drawings they may be used; and in copying of leaves or flowers, beautiful pictures, which appear to glow with the natural colors, are procured.

CHAPTER XIV.

ON THE THEORY OF THE DAGUERRETYPE.

Few papers have been published which so completely investigate the phenomena of the daguerreotype, as that of Mr. George Shaw, of Birmingham, who pursued his experiments in association with Dr. Percy. This paper published in the *Philosophical Magazine* for December, 1844, we transfer, as giving a large amount of the most valuable information.

"It is well known that the impression produced by light on a plate of silver rendered sensitive by M. Daguerre's process, is wholly destroyed by a momentary exposure of the plate to the vapor of either iodine or bromine. Although this fact has long been known, the nature of the action by which so extraordinary an effect is produced has not yet been satisfactorily explained. In the hope of elucidating this subject, a series of experiments was instituted, the results of which are recorded in the following remarks.

"A silver plate prepared by exposure to iodine or its compound with bromine, may be exposed to the vapor of mercury without being in any way affected by the exposure. If, however, the prepared plate be previously exposed to light, or made to receive the luminous image formed in the camera-obscura, the mercurial vapor attacks it; forming, in the former case, a white film, and in the latter, a picture corresponding to the luminous image which had been allowed to fall on it.

"If a prepared plate, after receiving a vertical impression by light, be exposed to the vapor of iodine or bromine, it is found that the vapor of mercury no longer attacks it; or, in other words, the impression produced by light is destroyed.

"The first experiments made for the purpose of arriving at the cause of this

phenomenon had reference to the relation between the time of the exposure to light and the time of exposure to the vapor of iodine or bromine necessary to destroy the effect produced by light. Prepared plates were exposed in the camera-obscura for a length of time, which previous experiment had determined to be sufficient for a full development of the picture; some of these plates were exposed during two seconds to an atmosphere feebly charged with the vapor of bromine, while others were carefully preserved from contact with the vapors of iodine or bromine. The atmosphere of bromine employed was produced by adding thirty drops of a saturated solution of bromine in water to an ounce of water; the solution was poured into a glass vessel, and the plate was exposed to the vapor in the vessel during the time specified. The plates were then introduced into the mercury box, and by volatilizing the metal pictures were developed on all those which had not been exposed to the vapor of bromine, while those which had been exposed to it exhibited no trace of a picture under the action of mercury.

"The same experiments were repeated with iodine, with exactly similar results.

"Prepared plates were exposed to diffused light in the shade, and others were exposed to the direct rays of the sun; the object being in both cases the production of a more intense impression than that produced by the feeble light of the camera-obscura. Some of these plates were exposed to the vapor of bromine, and others to the vapor of iodine, while others were carefully preserved from the vapors of those substances. On subsequent exposure to the vapor of mercury, those plate which had not been exposed to iodine or bromine, exhibited, by the large quantity of mercury which condensed on them, the effects of exposure to intense light; while those which had been subjected to the action of either bromine or iodine were in no way affected by the vapor of mercury. Many repetitions of these experiments demonstrated that the effect of exposure to the most intense light was completely destroyed by the shortest exposure to the vapor of bromine or iodine.

"Experiments were now instituted for the purpose of ascertaining in what condition the prepared plate was left after hav-

ing been first exposed to light and afterwards exposed to the vapor of bromine and iodine. In these experiments a method of treatment somewhat different from and more convenient than that described, was resorted to, as in practising that method effects occasionally presented themselves which interfered with the results, and rendered it difficult to determine with certainty how far some of the appearances produced were due to the action of light.

It is well known that a prepared plate has a maximum of sensitiveness when the iodine and bromine are in a certain relation to each other; if there be a deficiency of bromine, the maximum of sensitiveness is not obtained, and, if there be an excess, the plate is no longer sensitive to light; but when exposed to the vapor of mercury, *without having been exposed to light*, becomes white all over, by the condensation of mercury thereon; that is to say, it exhibits the appearance of the plate which had been *properly* prepared, and which *had* been exposed to light. From this it will be evident, that a plate properly prepared in the first instance, and then exposed to light, may, by subsequent exposure to the vapor of bromine, have the impression produced by light *wholly destroyed*; and yet, by the accumulation of bromine, may exhibit, on exposure to mercury, an appearance similar to that due to light. In other words, it is impossible (in the case supposed) to distinguish between an effect produced by light and an effect due to excess of bromine. By using iodine in the place of bromine, there is no risk of producing the appearance which accompanies excess of bromine; but, on the other hand, by augmenting the quantity of iodine, the sensitiveness of the plate is diminished. These difficulties were overcome by using a solution containing both iodine and bromine, in such proportions that the evaporation of each should take place in the proportion in which they produce on silver the most sensitive surface. The solution employed was made by adding alcoholic solution of iodine to a solution of chlorate of potash, until the latter would take up no more of the former, and to each ounce, by measure, of this solution, ten drops of a saturated solution of bromide in water were added. The solution of chlorate of potash was

made by diluting one part of a saturated solution of the salt with ten parts of water. The use of the chlorate is simply as a solvent of iodine. In the subsequent experiments, the plate was exposed to the vapor of this mixture of iodine and bromine with precisely the same effect as when either was used separately, and without the inconvenience, or uncertainty, which attended their use.

"A number of preliminary experiments, the detail of which would be uninteresting appeared to indicate, that not only is the effect of light on a daguerreotype plate destroyed by iodine or bromine, but that the plate is restored to its original condition; in other words, that its sensitiveness to light is restored. In order to determine this point, the following experiments were made.

"A prepared plate was exposed to light and afterwards to the mixed vapor;* mercurial vapor produced no effect upon it after a long exposure; the plate on removal from the mercury box was a second time exposed to light, and again introduced into mercurial vapor. The appearance of the plate was very little changed, and it was concluded that no effect, or, if any, very little, was produced by the second exposure to light. This conclusion was, however erroneous, as the following experiments proved:—

"A prepared plate was exposed to light, and afterwards to the mixed vapor; mercurial vapor was found to have no effect upon it; the plate was then partly covered with a metallic screen, fixed close to, but not in contact with it, and the whole was exposed to light. On placing the plate in the mercury box, a broad white band nearly corresponding to the edge of the defended part, made its appearance; the whole of the defended part (excepting the band in question) was unaffected, and the exposed part exhibited very little change. By a careful examination of the plate after it was removed from the mercury box, the white band in the middle appeared to be produced by the feeble light which had passed under the edge of the

* "I shall hereafter call the mixed vapors of iodine and bromine produced in the way described in the last paragraph but one, *mixed vapor*, in order to avoid circumlocution.—G. S."

metal plate which had screened the light from part of the prepared surface; and the very dark, and apparently unaltered appearance of the exposed part was occasioned by an excess of action, for mercury was found to have condensed on that part in large quantities, and to have produced the dark lead color which is commonly called *solarization*; but which effect in the case in question, was so excessive, that the color of the part on which mercury had condensed differed but very slightly from that on which no light had fallen. It was now evident that the apparent absence of effect in the last experiment was in reality occasioned by an excess of action; and by repeating that experiment, and making the time of the second exposure to light much shorter than before, the plate assumed, under the action of mercury, an intense and beautiful whiteness.

"From these experiments, then, it was perfectly clear that the impression produced by the light on a daguerreotype plate is wholly destroyed by the mixed vapor, and that *its sensitiveness to light is restored*.

"It now remained to discover to what extent the sensitiveness is restored by the treatment in question. It was not at first expected that the sensitiveness to light was as great after this treatment as after the original preparation of the plate; but experiment afterwards proved that the surface lost none of its sensitiveness by this treatment, nor even by numerous repetitions of it. A prepared plate was exposed to light; the impression was destroyed and sensitiveness restored by the mixed vapor; the plate was a second time exposed to light and a second time to bromine, still its sensitiveness appeared unimpaired; for a fourth or fifth exposure gave, on treatment with mercurial vapor, a vivid impression. In order to determine with the greatest accuracy if the sensitiveness of the prepared surface was at all impaired by these repeated exposures to light, the camera-obscura was resorted to. A series of plates was prepared with the utmost attention to uniformity; some of these were exposed in the camera-obscura, and pictures obtained by the subsequent exposure to vapor of mercury; the time requisite for the proper development of the picture was noted; others were first exposed to

the direct rays of the sun, and afterwards to the mixed vapor, and these were exposed in the camera-obscura for the same length of time as those which had not been exposed to light. On treatment with mercurial vapor perfect pictures were produced, which could not be distinguished from those taken on plates prepared by the ordinary method. So completely does the mixed vapor restore the sensitiveness of prepared plates after exposure to light, that the most beautiful impressions were obtained in the camera-obscura in two seconds on plates which had previously been four times exposed to the direct light of the sun, and after each such exposure treated with the mixed vapor.

"As the plates experimented on, to this stage of the inquiry, had been wholly exposed to the sun's light previous to exposure in the camera-obscura, it was thought that possibly some slight effect was produced, which from being the same on all parts of the plates, escaped observation; and in order to avoid the possibility of error from this cause, the impressions of light which it was intended to destroy by bromine were afterwards made in the camera-obscura being pointed first at a house, afterwards to a bust, next to a tree, and finally to a living figure, the plates, after each impression, excepting the last, being momentarily exposed to the mixed vapor. In every instance the most perfect impressions of the objects to which the camera-obscura was last directed were obtained, and no trace of the previous impressions was left.

"Experiments were next instituted for the purpose of ascertaining if the prepared surface, after the process of mercurialization could be made to receive another impression by treatment with mixed vapor. Impressions were taken with the camera-obscura, and after the full development of the picture by vapor of mercury, the plates were exposed to bromine and again placed in the camera-obscura, the instrument being directed in different experiments to different objects: on exposure to mercurial vapor, other pictures made their appearance, and although confused from superposition on the first pictures, could be clearly traced, and were found perfect in every part. This production of picture upon picture was repeated, until by the

confusion of the superposed images the effects of further exposure could be no longer distinguished.

"In all the experiments hitherto described the destruction of the impressions by bromine was effected in the dark, the apparatus being situated in a room into which only a very feeble daylight was admitted. It remained to be discovered if the mixed vapor had the power of destroying the effect of light while the plate was still exposed to light, or if the vapor had the power of *suspending* or *preventing* the action of light on a daguerreotype plate. In order to determine this point, the apparatus was placed near the window of a well-lighted room, and so arranged, that during the whole time of the preparation of the plate, by exposure first to iodine and afterwards to bromine, it was exposed to full daylight, and by a mechanical arrangement, of too obvious a nature to render description necessary, the plate was withdrawn from the bromine vessel into a dark box; that is to say, it was withdrawn at the same moment from the influence of both light and bromine; on being placed in the camera-obscura, plates so prepared received impressions which by mercurialization produced excellent pictures, and there was no trace of the action of any light save that of the camera-obscura. It follows, then, that light is incapable of exerting any appreciable influence on daguerreotype plates during the time they are receiving their coatings of iodine or bromine.

"Although these experiments afford no information on the subject in reference to which they are originally undertaken, they are yet not without interest, both in their theoretical bearing and in their practical application. They demonstrate not only that the change (whatever it may be) effected by light on silver plates prepared by Daguerre's process is completely suspended in the presence of the vapor of either iodine or bromine, but after that change has been produced the impression may be destroyed and the plate restored to its original condition, by a momentary exposure to either of these vapors. In their practical application these experiments show, that all the care which has been taken to exclude light from daguerreotype plates during their preparation is unneces-

sary; that so far from a dark room being essential to the operations of the daguerreotype artist, the light of day may be allowed to fall on the plate during the whole time of its preparation; and that it is only necessary to withdraw it at the same moment from the action of bromine and light by sliding it from the bromine vessel into the dark box in which it is carried to the *camera-obscura*; and where, from the situation or otherwise, there is a difficulty in observing the color of the plate during the process of iodizing, it may be removed from the iodine vessel, and its color examined by the direct light of the sun, without risk or injury: for when returned to the iodine or bromine vessel for a moment the effect of light is wholly destroyed.

"Perhaps the most valuable practical application of these facts is in the use of the same plate for receiving several impressions. When, on taking the portrait or picture of any object liable to move, there is reason to suppose that the motion of the person or object has rendered the operation useless, it is not necessary to throw aside the plate on which the imperfect impression has been taken, and resort to the tedious process of cleaning and preparing another; it is only necessary to treat the plate in the manner already pointed out, and it is again equal in every respect to a newly prepared plate; and this treatment may be repeated, until, by the slow accumulation of too thick a film of iodide of silver, the plate no longer possesses the same degree of sensitiveness to light."

Similar researches have been pursued by M. Claudet, from whose Memoirs we extract the following particulars:—

The phenomena which have not yet been satisfactorily explained, and of which I shall have to treat in the present paper, are those referring to the following points:—

1. What is the action of light on the sensitive coating?
2. How does the mercurial vapor produce the daguerreotype image?
3. Which are the particular rays of light that impart to the chemical surface the affinity for mercury?
4. What is the cause of the difference in achromatic lenses between the visual and photogenic lenses? Why do they constantly vary?
5. What are the means of measuring the

photogenic rays, and of finding the true focus at which they produce the image?

At the last meeting of the British Association, which took place at Swansea, I announced that the decomposition of the chemical surface of the daguerreotype plate, by the action of certain rays of light, produced on that surface a white precipitate, insoluble in the hyposulphite of soda, which, when examined by the microscope, had the appearance of crystals reflecting light, and which, when seen by the naked eye, were the cause of a positive daguerreotype image.

This fact had not been observed before. The opinion of Daguerre himself, and other writers, was, that the action of light on the iodide of silver had only the effect of darkening the surface, and consequently of producing a negative image. But it escaped them, that, under the darkened iodide of silver, another action could take place after a continued exposure to light, and that the hyposulphite of soda washing could disclose a positive image. I have proved this unexpected fact in obtaining, by the action of light only, and without mercury, images having the same appearance as those developed under the action of mercurial vapor. This direct and immediate effect of light is certainly remarkable; but the daguerreotype process is not founded on that principle, on account of the slowness of its action; and it is fortunate that, long before light can produce the white precipitate I have alluded to, it operates another effect, which is the wonderful property of attracting the vapor of mercury. This vapor is condensed in the form of a white powder, having also, when examined by the microscope, the appearance of reflecting crystals. The daguerreotype image is due to this property, which is the most beautiful feature of Daguerre's discovery.

It is probable that light exercises a two-fold action on the iodide of silver, whether it is combined or not with chlorine or bromine. By one, the iodide is decomposed, and the silver set free is precipitated on the surface in the form of a white powder or small crystals; by the other, which begins long before the former, the parts affected by light have been endowed with an affinity for mercurial vapor.

By means of my photophometer, to the principle of which I shall presently

refer, I have been able to ascertain that the pure light of the sun performs in about two or three seconds the decomposition of the bromo-iodide of silver, which is manifested by the white precipitate; while the same intensity of light determines the affinity for mercurial vapor in the wonderfully short space of about 1-1000th part of a second. So that the affinity for mercury is imparted by an intensity of light 3000 times less than that which produces the decomposition manifested by the white precipitate.

For this reason it is difficult to suppose that the two actions are the same. We must admit that they are different. Long before it can effect the decomposition of the surface, light imparts to the sensitive coating the affinity for mercurial vapor; and this appears to be the principle of the formation of the image in the daguerreotype process.

In a paper I communicated to the Royal Society on the 17th of June, 1847 (see Transactions), and an abstract of which I read before the Association at Oxford, I stated that the red, orange, and yellow rays were destroying the action of white light, and that the surface was recovering its former sensitiveness or unaffected state after having been submitted to the action of these rays. I inferred from that curious fact that light could not have decomposed the surface; for if it had, it would be difficult to understand how the red, orange, or yellow rays could combine again, one with another, elements so volatile as bromine and iodine, after they had once separated from the silver.

But I had not yet been able to ascertain that, when light has decomposed the bromo-iodide of silver, the red, orange, or yellow rays cannot restore the surface to its former state. The action of light, which can be destroyed by the red, orange, or yellow rays, does not determine the decomposition, which would require an intensity 3000 times greater; it is the kind of action produced by an intensity 3000 times less, giving the affinity for mercury, which is completely destroyed by the red, orange, or yellow rays. It seems, therefore, that I was right in saying that there was no decomposition of the compound during the short action which is sufficient to give the affinity for mercury, and in ascribing the formation of the image only to that affinity.

White light, or the chemical rays which accompany it, communicate to the surface the affinity for mercury, and the red, orange, or yellow rays withdraw it. I must notice here a singular anomaly; viz. that when the sensitive surface is prepared only with iodine without bromine, the red, orange, or yellow rays, instead of destroying the action of white light, continue the effect of decomposition as well as that of affinity for mercury. Still there is a double compound of iodine which is far more sensitive than the simple compound, and on which the red, orange, or yellow rays exercise their destructive action as in the case of the bromo iodide.

The phenomenon of the continuing action of the red, orange, or yellow rays, on the simple compound of iodide of silver, was discovered by M. Ed. Becquerel; and soon after M. Gaudin found, that only those rays continue the action by which mercury is deposited, but that they develop without mercury an image having the same appearance as that produced by mercurial vapor.

M. Gaudin, not having observed the fact of the white precipitate, which is the result of the decomposition by the action of light, could not explain the cause of the image brought out under the influence of the yellow ray.

I have observed that the iodide of silver without bromine is about 100 times more sensitive than the bromo-iodide to the action of light, which produces the decomposition of the compound forming the white precipitate of silver, while it is 100 times less sensitive for the effect which gives the affinity for mercury. This seems another reason for supposing that the two actions are different. It may be that, in the case of the iodide of silver alone, the decomposition being more rapid, and the affinity for mercury slower than when bromine is added to the compound, the red, orange, or yellow rays having to act upon an incipient decomposition, have the power, by their own photogenic influence, of continuing the decomposition when it has begun. This may explain the development of the image under red, orange, or yellow glasses, according to M. Gaudin's discovery. But in the case of the bromo-iodide of silver, the red, orange, or yellow rays have to exert their action on the affinity for mercur-

ry, begun a long time before the decomposition of the compound; and they have the property of destroying that affinity.

So that it would appear that all the rays of light have the property of decomposing the iodide of silver in a longer or shorter time, as they have that of producing the affinity for mercury on the bromo iodide of silver: with the difference, that on the former compound the separate actions of the several rays continue each other, and that on the second compound these separate actions destroy each other. We understand that, in the first case, all the rays are capable of operating the same decomposition; and that in the second, the affinity for mercury when imparted by one ray is destroyed by another. This would explain the various phenomena of the formation of the two different deposits I have described, and also explain the anomaly of the continuation of the action of light by the red, orange, or yellow rays, according to M. Ed. Becquerel's discoveries on the iodide of silver; and of the destruction of that action by the same rays, according to my own observations on the bromo-iodide of silver.

The red, orange, and yellow rays, when acting on unaffected surface are considerably less capable than the most refrangible rays of imparting the affinity for mercurial vapor on both the iodide and bromo-iodide of silver; and they destroy that affinity when it has been produced on the bromo-iodide of silver by the photogenic rays. It follows from this fact, that when the red, orange, or yellow rays are more abundant in the light than the most refrangible rays, the photogenic effect is retarded in proportion to the excess of these antagonistic rays. This happens when there exist in the atmosphere some vapors which absorb the most refrangible rays. In these circumstances the light appears rather yellow; but it is very difficult to judge by the eye of the exact color of the light, and of the proportion of photogenic rays existing in the atmosphere at any given moment.

The vapors of the atmosphere which render the light yellow, act as any other medium intercepting the blue rays and those which have the same degree of refrangibility. I prove, by a very simple experiment, the comparative photogenic action of rays which have passed through such

media, and of those which have met with no similar obstacle; also that media which intercept the photogenic rays can let pass freely the illuminating rays.

If I cover an engraving one-half with light yellow glass, and place it before my camera-obscura, in order to represent the whole on a daguerreotype plate, I find that during the time which has been necessary to obtain the image of the half not covered, not the slightest effect has been produced on the half covered with the yellow glass.

Now, if I cover one half with deep-blue glass, and the other with the same light yellow glass, the engraving will be seen very distinctly through the yellow glass, and not at all through the blue. In representing the whole, as before, on the daguerreotype plate, the half which was clearly seen by the eye has produced no effect: and in the other, which could not be seen, is as fully represented, and in nearly as short a time, as when no blue glass had been interposed.

Thus we might construct a room lighted only through an inclosure of light yellow glass, in which light would be very dazzling to the eye, and in this room no photographic operation could be performed; or a room inclosed by deep blue glass, which would appear very dark, and to which the photographic operation would be nearly as rapid as it would be in the open air.

Thus we may conceive certain states of the atmosphere under which there will be an abundance of illuminating rays, and very few photogenic rays; and some others, under which the reverse will take place.

Considering how difficult it is to judge by the eye alone of the photogenic state of light, we can understand why the photographer is constantly deceived in the effect he tries to produce, having no means to try before hand, with any degree of certainty, the intensity of light. For these reasons I turned my attention to contrive an apparatus by which I could test at the same time the sensitiveness of the daguerreotype plate and the intensity of light.

I succeeded in constructing an instrument which I have called a photographometer,—the description of which is given in another place.

By this instrument I have been able to discover at what degree of intensity of

light the effect called solarization is produced: on well-prepared plates of bromo-iodide it does not begin under an intensity 212 times greater than that which determines the first effect of mercury; and also at what degree the decomposition producing the white precipitate without mercury manifests itself, both on iodide and on bromo-iodide of silver. On the first, it is 100 times quicker than on the bromo-iodide; and on the last, it is produced by an intensity 3000 times greater than that which develops the first affinity for mercury.

In the course of my experiments I noticed a curious fact, which proved very puzzling to me, until I succeeded in assigning a cause to it. I shall mention it here, because it may lead to some further discoveries. I observed that sometimes the spaces under the round holes, which had not been affected by light during the operation of the photographometer in a sufficient degree to determine the deposit of mercury, were, as to be expected, quite black; while the spaces surrounding them were in an unaccountable manner slightly affected by mercury. At first I could not explain the phenomenon, except by supposing that the whole plate had been previously by accident slightly affected by the light, and that the exposure through the holes to another sort of light had destroyed the former effect. I was naturally led to that explanation, having before observed that one kind of light destroys the effect of another; as, for example, that the effect of the light from the north is destroyed by the light from the south, when certain vapors existing in the latter portion of the atmosphere impart a yellow tint to the light of the sun. But after repeated experiments, taking great care to protect the plate from the least exposure to light, and recollecting some experiments of M. Moser, I found that the affinity for mercury had been imparted to the surface of the daguerreotype plate by the contact of the metallic plate having the round holes, while the space under the hole had received no similar action. But it must be observed that this phenomenon does not take place every time; some days it is frequent, and in some others it does not manifest itself at all. Considering that the plate furnished with round holes is of copper, and that the daguerreotype plate is of silver plated on cop-

per, it is probable that the deposit of mercury is due to an electric or galvanic action determined by the contact of the two metals; and perhaps the circumstance that the action does not take place every time, will lead to the supposition that it is developed by some peculiar electric state of the ambient atmosphere; and by a degree of dampness in the air which would increase the electric current. May we not hope that the conditions being known in which the action is produced, and by availing ourselves of that property, it will be possible to increase on the daguerreotype plate the action of light? for it is not improbable that the affinity for mercury imparted to the plate is also due to some electrical influence of light. How could we otherwise explain that affinity for mercury given by some rays and withdrawn by some others, long before light has acted as a chemical agent?

The question of the photogenic focus is involved in another kind of mystery, which requires some attention. I have found that with the same lenses there exists a constant variation in the distance between the two foci. They are never in the same relation to each other: they are sometimes more or less separate; in some lights they are very distant, and in some others they are very near, and even coincide. For this reason I constantly try their position before I operate. I have not been able to discover the cause of that singular phenomenon, but I can state positively that it exists. At first, I thought that some variations in the density or dispersive power of the atmosphere might produce the alteration in the distance between the two foci; or that when the yellow rays were more or less abundant, the visual rays were refracted on different points on the axis of the foci, according to the mean refrangibility of the rays composing white light at the moment. But a new experiment has proved to me that these could not be the real causes of the variation. I generally employ two object-glasses; one of short focus for small pictures, and the other of longer focus for larger images. In both, the photogenic focus is longer than the visual focus; but when they are much separated in one they are less so in the other: sometimes, when they coincide in one, they are very far apart in the other, and sometimes they both coin-

cide. This I have tried every day during the last twelve months, and I have always found the same variations. The density of the atmosphere, or the color of light, seems to have nothing to do with the phenomenon, otherwise the same cause would produce the same effect in both lenses. I must observe, that my daily experiments on my two object-glasses are made at the same moment and at the same distance for each, otherwise any alteration in the focal distance would disperse, more or less, the photogenic rays, which is the case, as it is easy to prove. The lengthening or shortening the focus, according to the distance of the object to be represented, has for effect to modify the achromatism of the lenses. An optician, according to M. Le-rebours' calculation, can at will, in the combination of the two glasses composing an achromatic lens, adapt such curvatures or angles in both that the visual focus shall coincide with the photogenic focus; but he can obtain this result only for one length of focus. The moment the distance is altered, the two foci separate, because the visual and photogenic rays must be refracted at different angles in coming out of the lense, in order to meet at the focus given for one distance of the object. If the distance is altered, the focus becomes longer or shorter; and as the angle at which different rays are refracted remains nearly the same, they cannot meet at the new focus, and they form two images. If the visual and photogenic rays were refracted parallel to each other, in coming out of the lens they would always coincide for every focus: but this is not the case. It seems, therefore, impossible that lenses can be constructed in which the two foci will agree for all the various distances, until we have discovered two kinds of glasses in which the densities or the refractive power will be in the same ratio as their dispersive power.

There is no question so important in photography as that which refers to finding the true photogenic focus of every lens for various distances. I have described the plan I have adopted for that purpose. By means of that very simple instrument, every photographer can always obtain well-defined pictures with any object-glasses. But there is another method of ascertaining the difference between the two foci, which has been lately contrived by Mr. G. Knight, of

Foster Lane, London. That gentleman has been kind enough to communicate to me the very ingenious and simple apparatus by which he can at once find the exact difference existing between the visual and photogenic focus, and place the daguerreotype plate at the point where the photogenic focus exists. I am very glad he has entrusted me with the charge of bringing his invention before the British Association. For the scientific investigation of the question, Mr. Knight's apparatus will be most valuable to the optician, as it will afford him the means of studying the phenomenon with mathematical accuracy.

Mr. Knight's apparatus consists in a frame having two grooves;* one vertical, in which he places the ground-glass, and the other forming an angle with the first destined to receive the plate; the planes of the grooves intersect each other in the middle. After having set the focus upon the ground glass, this last is removed, and the plate is placed in the inclined groove. Now, if a newspaper, or any large printed sheet is put before the camera, the image will be represented on the inclined plate; and it is obvious in its inclination the various points of the plate will meet at a different focus. The centre of the plate will coincide with the visual focus; by its inclination it will in one direction meet the photogenic focus at a point more or less distant from the centre, if the photogenic focus is shorter than the visual focus, and in the other direction if it is longer. The frame is furnished with a scale of division, having the zero in the centre. When the image is represented on the daguerreotype, by applying against it another moveable scale of division similar to the other, the operator can find what is the division above or under zero, at which the image seems best defined; and after having removed from the camera the experiment frame, and set the focus as usual on the ground glass, he has only to move the tube of the object-glass by means of the rack and pinion, and to push it in or out; a space corresponding with the division of the scale indicating the deviation of the true photogenic focus; the tube of the object-glass is for that purpose marked with the same scale of division.

* For engravings of this apparatus see No. 1, Vol. 2, pages 46 and 47, Pho. Art-Journal.

In addition to these valuable communications, I would give my own remarks as they were formerly published, which, as it appears to me, still satisfactorily express the phenomena.

Numerous speculations having been ventured as to the peculiar chemical changes which light produces on the iodated silver tablets, I shall make no apology for introducing a few remarks on this very interesting subject.

Numerous experiments on plated copper, pure silver plates, and on silvered glass and paper, have convinced me that the first operations of polishing with nitric acid, &c., are essential to the production of the *most sensitive surface*. All who take the trouble to examine the subject will soon be convinced that the acid softens the silver, bringing it to a state in which it is extremely susceptible of being either oxidized or iodized, according as the circumstance may occur of its exposure to the atmosphere or to iodine.

I have discovered that all the rays of the prismatic spectrum act on the daguerreotype plate, except the yellow, and a circle of light of a peculiar and mysterious character, which *surrounds* the visible spectrum. The light acting on a prepared tablet, decomposes the film of *ioduret of silver* to different depths, according to the order of refrangibility of the rays: the violet ray effecting perfect decomposition, whilst the red acts to a depth inappreciably slight. Thus it is, that the spectrum impressed on a daguerreotype plate reflects the natural colors, in the same manner as Sir Isaac Newton has shown thin films act under other circumstances; the thickness of each film of reduced silver on the plate being in exact proportion to the chemical agency of the colored ray by which it was decomposed.

On photographic papers, the decomposed argentine salt exists in a state of oxide, mixed, in all probability, with some revived metal; but on the silver tablet the iodine is liberated from all the parts on which the light acts, and pure silver in a state of extreme division results. The depth to which the decomposition has been effected being in exact relation to the intensity and *color* of the light radiated from the object which we desire to copy, the mercurial vapor unites with different proportions of sil-

ver, and thus are formed the lights and middle tints of the picture. The shadows are produced by the unchanged silver from which the *ioduret* is removed by the hyposulphite of soda.

Daguerre himself laid much stress upon the necessity of exposing the plate to the mercury at an angle of about 45° . This, perhaps, is the most convenient position, as it enables the operator to view the plate distinctly, and watch the development of the design; but beyond this, I am satisfied there exists no real necessity for the angular position. Both horizontally and vertically, I have often produced equally effective daguerreotypes. Looking at a daguerreotype picture in such a position that the light is incident and reflected at a large angle, the drawing appears of the *negative* character—the silver in such a position appearing white, and the amalgam of mercury and silver a pale gray. View the plate in any position which admits of but a small angle of reflection, and we then see the design in all its exquisite beauty, correct in the arrangement of its lights and shades,—the silver appearing black, while the amalgam, by contrast in part, and partly in reality, appears nearly white. A very ingenious idea has been promulgated, that the light crystalizes the ioduret of silver, and that the mercury adheres to one of the facets of each minute crystal. If this was the case, the picture could be seen distinctly in one position only, whereas in many different positions it is equally clear. There does not appear to be any more difficulty in explaining why the mercurial amalgam should vary in its tint with change of position, than in explaining why a common mirror, or a polished metal plate, should appear white when viewed at one angle, and black in another.

CHAPTER XVI.

ON INSTRUMENTS FOR DETERMINING THE VARIATIONS OF ACTINIC POWER, AND FOR EXPERIMENTS ON THE CHEMICAL FOCUS, AND THE REGISTRATION OF PHILOSOPHICAL INSTRUMENTS.

There are so many advantages attendant on self-registration, as to make the perfection of it a matter of much interest to every scientific enquirer. The first who suggested the use of photographic paper for this

purpose was Mr. T. B. Jordan, who brought the subject before a committee of the Royal Cornwall Polytechnic Society, on the 18th of February, 1839, and exhibited some photographic registers on the 21st of March of the same year. The plan this gentleman adopted was to furnish each instrument with one or two cylinders containing scrolls of photographic paper. These cylinders are made to revolve slowly by a very simple connection with a clock, so as to give the paper a progressive movement behind the index of the instrument, the place of which is registered by the representation of its own image.

The application of this principle to the barometer or thermometer is most simple; the scale of either of these instruments being perforated, the paper is made to revolve as close as possible to the glass, in order to obtain a well defined image. The cylinder being made to revolve on its axis once in forty-eight hours, the paper is divided into forty-eight parts by vertical lines, which are figured in correspondence with the hour at which they respectively arrive at the tubes of the instruments. The graduations on the paper correspond to those on the dial of the barometer or scale of the thermometer, and may be printed on the paper from a copper-plate, or, what is much better, may be printed by the light at the same time from opaque lines on the tube, which would of course leave a light impression on the paper: by this means we should have all that part of the paper above the mercury darkened, which would at the same time be graduated with white lines, distinctly marking the fluctuations in its height for every minute during daylight, and noting the time of every passing cloud.

Mr. Jordan has also published an account of his very ingenious plan of applying the same kind of paper to the magnetometer or diurnal variation needle,* and several other philosophical instruments; but as these applications were not at the time entirely successful, owing principally to the difficulty of finding a suitable situation for so delicate an instrument, it is thought unnecessary to occupy these pages with any particular description of the arrangements adopted, which, however, were

* See the Sixth Annual Report of the Royal Cornwall Polytechnic Society.

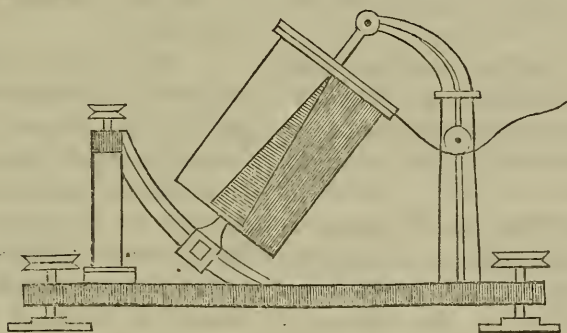
in all essential points similar to those employed by Mr. Brooks, and adopted in some of our magnetic and meteorological observatories.

Mr. Brooks attaches a reflector to the end of a delicately suspended magnet; this reflects a pencil of strong artificial light upon photographic paper placed between two cylinders of glass, which are kept in motion by a small clock arrangement. As the paper moves in a vertical direction whilst the magnet oscillates in a horizontal one, a zigzag line is marked on the paper; the extent of movement on either side of a fixed line showing the deviation of the magnet for every hour of the day.

One subject, however, which, at the same time that it is highly philosophical, is of a more popular character, must not pass unnoticed. The registration of the ever-varying intensity of the light is so important a subject, that it has occupied the attention of several eminent scientific observers. Sir John Herschel and Dr. Daubeny have applied their well-known talents to the inquiry, and have, both of them, devised instruments of great ingenuity for the purpose. The instrument constructed by Sir John

Herschel, which he has named an *actinograph*, not only registers the *direct* effect of solar radiation, but also the amount of general illumination in the visible hemisphere, which constitutes daylight; one portion of the apparatus being so arranged that a sheet of sensitive paper is slowly moved in such a direction, that the direct rays of the sun, when unobscured, may fall upon it through a small slit made in an outer cylinder or case, while the other is screened from the incident beam. The paper being fixed on a disc of brass, made to revolve by watch-work, is affected only by the light which "emanates from that definite circumpolar region of the sky to which it may be considered desirable to limit the observation," and which is admitted, as in the other case, through a fine slit in the cover of the instrument.

Mr. Jordan has devised an instrument for numerically registering the intensity of the incident beam, which appears to have some peculiar advantages, a description of which I shall take the liberty of transcribing. Figure 44 is an elevation of the instrument: it consists of two copper cylinders supported on a metal frame, the



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interior one is fixed to the axis and does not revolve, being merely the support of the prepared paper; the interior cylinder is made to revolve about this once in twenty-four hours by a clock movement. It has a triangular aperture cut down its whole length, as shown in the figure, and it carries the scale of the instrument, which is made to spring closely against the prepared paper. This scale or screen is composed of a sheet of metal foil between two sheets of varnished paper, and is divided into one hundred parts longitudinally, every other part being cut out, so as to admit the light

to the prepared paper without any transparent medium intervening. The lengths of the extreme divisions, measuring round the cylinder, are proportioned to each other as one to one hundred; consequently the lower division will be one hundred times longer passing over its own length, and the lines of prepared paper upon these divisions will, of course, be exposed to the light for times bearing the same proportion to each other.

Now, as the sensitiveness of the paper can readily be adjusted, so that the most intense light will only just tint it through

the upper division during *its passage* under the opening, and the most feeble light will produce a similar tint through the lower division during *its passage*, the number of lines marked on the paper at a given time, will furnish a comparative measure of the intensity of solar light at that time, and may be registered as so many degrees of the *Heliograph*, the name Mr. Jordan has given his instrument, just as we now register the degrees of the thermometer.

An instrument of this kind was made by me for the British Association, and experiments carried on with it, at intervals, for some years. Many of the results were very curious, but the instrument being placed at the Observatory at Kew, the observations were unfortunately discontinued. It is believed that, with an instrument properly constructed—the details of the one employed were capable of much improvement—many very remarkable alterations in the relative chemical power of the solar radiations would be detected. From the indications I have obtained, I believe there exists a constant law of change, and that the correct expression of the phenomena are expressed in the following passages—the concluding summary of my Report on this subject to the British Association of Edinburgh.

It will be evident that the question which assumes the most prominence in our consideration of these remarkable phenomena is that of the identity or otherwise of light and actinism.

Fresnel has stated that the chemical effects produced by the influence of light are owing to a mechanical action exerted by the molecules of æther on the atoms of bodies, so as to cause them to assume new states of equilibrium dependent on the nature and on the velocity of the vibrations to which they are subjected.

Arago says, it is by no means proved that the photogenic modifications of sensitive surfaces result from the action of solar light itself. These modifications are perhaps engendered by invisible radiations mixed with light properly so called, proceeding with it, and being similarly refracted.

These views fairly represent the condition in which the argument stands, and a yet more extensive set of experiments seems to be necessary before we can decide the

question. It appears, however, important that we should dismiss, as completely as possible, from our minds, all preconceived hypotheses. The phenomena were all unknown when the theories of emission and of undulation were framed and accepted in explanation of luminous effects: and it will only retard the discovery of the truth, if we prosecute our researches over this new ground, with a determination to bend all our new facts to a theory which was framed to explain totally dissimilar phenomena.

We may sum up the amount of our knowledge of the chemical influences of the solar radiations as follows:—

1. The rays, having different illuminating or calorific powers, exhibit different degrees and kinds of chemical action.

2. The most luminous rays exhibit the least chemical action upon all inorganic matter. The least luminous and the non-luminous manifest very powerful chemical action on the same substances.

3. The most luminous rays influence all substances having an organic origin, particularly exciting vital power.

4. Thus, under modifications, chemical power is traced to every part of the prismatic spectrum; but in some cases this action is positive, *exciting*; in others negative, *depressing*.

5. The most luminous rays are proved to prevent all chemical change upon inorganic bodies exposed, at the same time, to the influence of the chemical rays.

6. Hence actinism, regarded at present merely as a phenomenon different from light, stands in direct antagonism to light.

7. Heat radiations produce chemical change in virtue of some combined action not yet understood.

8. Actinism is necessary for the healthful germination of seed; light is required to excite the plant to decompose carbonic acid; caloric is required in developing and carrying out the reproductive functions of the plant.

9. Phosphorescence is due to actinism, and not to light.

10. Electrical phenomena are quickened by actinism, and retarded by light.

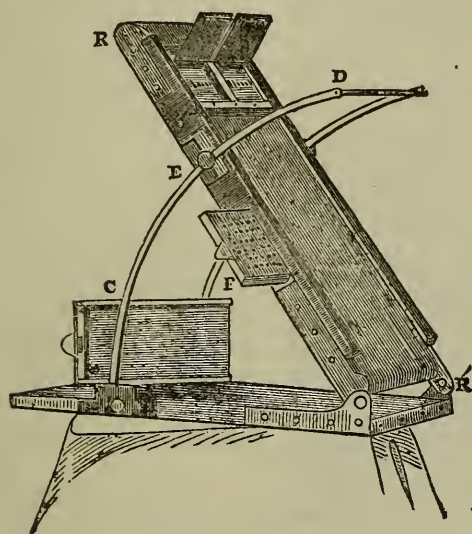
Numerous other points of minor importance will present themselves on studying the facts described. Without venturing to obtrude my own views, I now leave the subject for that full investigation which it

will, I trust, receive, as promising beyond all others to enlighten us on those curious phenomena which appear to link together the organic and the inorganic worlds.

THE PHOTOGRAPHOMETER.

Mr. Claudet has devised the photographometer and the dynactinometer for measuring the intensity of the actinic radiations. These are both most ingenious instruments, the operations of which will be rendered intelligible by the following description:—

The accompanying figure (45) shows the

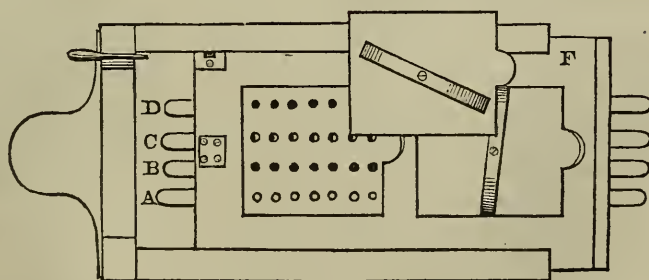


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photographometer complete. The sensitive plate or paper is placed in a dark box, which is fixed in an independent frame, as shown, Figs. 46 and 47, and as placed in its position at F in the adjoining cut. A black silk webbing being fixed to the moveable plate seen at the head of the in-

able plate are parallel to each other. They are seven in number, each opening being one-half of the following one, and double that of the preceding one. Thus, after the operation of the light, we have seven separate images, the different intensities of which represent the action of light during the intervals of time in the geometric progression of—1 : 2 : 4 : 8 : 16 : 32 : 64 :

The box in which the plate or paper is placed for experiment, is pierced with holes, and these correspond with the slits in A. B. (fig. 47.) By inclining the instrument, which can be very readily done to any degree, by means of the curved arms C D E, any velocity can be given to the falling screen, and thus the plate be exposed to the action of the chemical rays for any period of time we please. Fig. 48* shows the result obtained on a plate by this instrument; the letters corresponding with the holes in the other wood-cuts. In Fig. 47 the screen with the vertical slits is shown at the moment it is supposed to be passing over the holes A B C D. In this example the plate had been exposed to the vapor of iodine, in such a manner that one zone had attained the first coating of yellow color; a second zone had reached the red—a third the blue and green—and a fourth having passed through all these tints, had obtained the second yellow coating. The number of white circular spots on each vertical zone indicates the degree of sensitiveness of the various coatings; the less sensitive being the first coating of yellow, D, and the most sensitive the second yellow coating, A. This is shown by the deposit of mercury on the plate represented by the

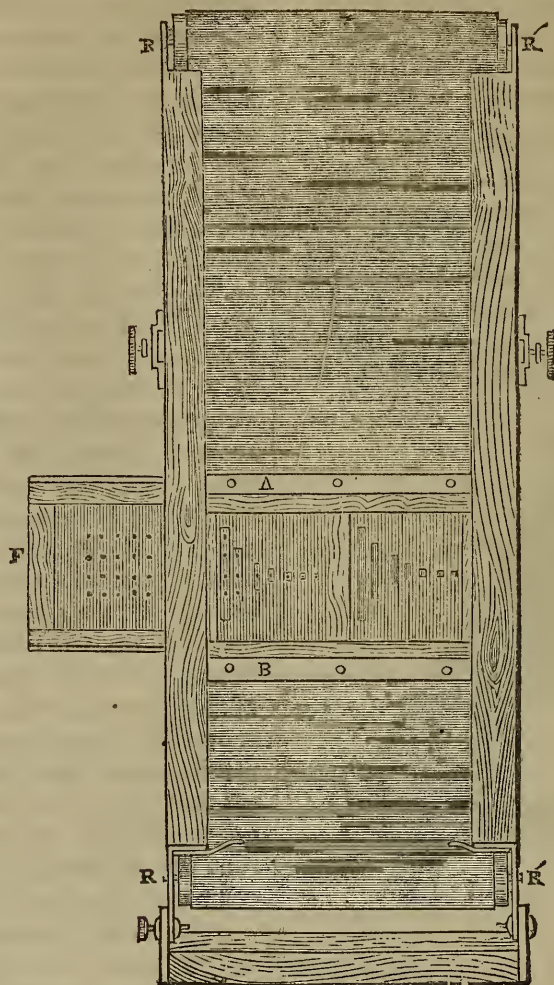


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strument, and strained over two rollers, R, R, it will be evident that the sensitive plate is screened from light until the moveable slide falling down the inclined plane passes over it. The openings in this move-

able plate are parallel to each other. They are seven in number, each opening being one-half of the following one, and double that of the preceding one. Thus, after the operation of the light, we have seven separate images, the different intensities of which represent the action of light during the intervals of time in the geometric progression of—1 : 2 : 4 : 8 : 16 : 32 : 64 :

* For an engraving of this fig. see No. 1, Vol. 2, page 43, Pho. Art-Journal.

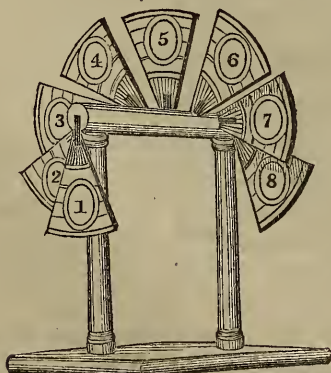


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having been exposed for the same time to solar influence.

THE FOCIMETER.

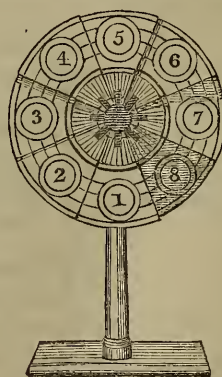
Mr. Claudet has also devised a very ingenious instrument for focusing, which he calls his Focimeter. (Fig. 49.) This it



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will be seen from the accompanying wood-cut, consists merely of segments of a cir-

cle, numbered and placed at fixed distances apart, upon a moveable axis. This is copied by the camera on a plate or paper, and the result is shown in the annexed figure (50), in which it will be seen different



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degrees of effect are supposed to have been produced. These determine the best focal point for any lens very readily, and it is

really a most useful piece of apparatus in the hands of the photographer.

THE DYNACTINOMETER.

The dynactinometer is thus described by the inventor:—it consists of a thin metallic disc, perfectly black, having a slit extending from its centre to the circumference, fixed on an axis revolving through a permanent metallic disc, perfectly white. The white disc has also a slit from its centre of the exact length of the radius of the black disc; and by means of these two slits, which are so adjusted that the black disc can intersect the white disc, and by revolving, gradually cover the whole white area, the space of the white surface on which the black disc can be superposed forms itself a sort of dial, which is divided into any number of equal segments, all numbered. The inventor has adopted the number of twenty segments for a large circle inscribed on the dial, and of eight segments for a smaller circle, after the manner of the divisions of the Focimeter, but on the same plane. These eight segments are numbered in geometrical progression, 1, 2, 4, 8, 16, 32, 64.

The black disc may be made to revolve in such a manner that it shall cover a new segment of the large circle during each second, or any other equal fraction of time. By that means the last segment will have received eight times more light than the first, the black disc having moved over the whole in eight seconds.

The differences of photogenic intensities are hardly observable when they follow the arithmetical progression: the instrument is so constructed that it may indicate the intensities in the geometrical progression. The first segment remains always covered, in order to be represented black on the daguerreotype plate and mark the zero of intensity: the second is exposed to light during 1 second, the third during 2, the fourth during 4, the fifth during 8, the sixth during 16, the seventh during 32, and the eighth during 64. This series, which could be extended by dividing the circle into a greater number of segments, is quite sufficient for all observations intended for practically measuring the intensity of the photogenic light, and for comparing the power of object-glasses.

The instrument is made to move by ap-

plying the hand on a handle fixed on the back at the extremity of the axis on which the disc revolves. An operator accustomed to count seconds by memory, or by following a seconds' beater, can perform the experiment with sufficient regularity; but in order to render the instrument more exact and more complete, it can be made to revolve by clock-work, which gives it at will either the arithmetical or the geometrical progression. This last movement presented some difficulty; but the inventor has been able to obtain it without much complication in the machinery, and the apparatus is within the reach of the greater number of operators having establishments on a complete footing.

For the instrument moving by hand, it is necessary that a second person should open and shut the object-glass at a given signal. But in adapting before the object-glass a flap connected with a cord and pulley, the operator, holding the cord in the left hand, can open the flap at the moment that with the right hand he makes the disc revolve, and shut the apparatus when the revolution is complete.

When the instrument acts by clock-work, the object-glass may be open and shut by the same means, at the signal given by a bell which strikes at the commencement and at the end of the revolution.

If a daguerreotype plate receive the image of the dynactinometer during its revolution, it is obvious that each segment indicates an effect in proportion to the intensity of light and to the time that it has remained uncovered; also that the number of seconds marked on the first segment visible is the measure of the intensity of light at the moment of the experiment; the effect of each segment being in reality the degree of intensity which can be obtained during the corresponding time.

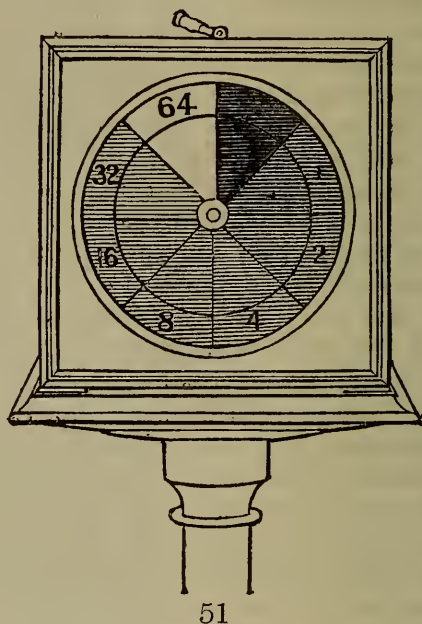
When we want to compare two object-glasses, they are adapted to two camera-obscura placed before the dynactinometer. After having set the focus of the two apparatus, they are charged each with a daguerreotype plate or a photogenic paper. When all is ready, the flaps are opened at the moment that the dynactinometer commences its revolution, and they are shut when it is completed. The plates are removed and the images brought out. In comparing the result produced on each, it

is easy to see which object-glass is the most rapid, and in what proportion. For instance, if the arithmetical progression has been followed, and on one of the plates or papers the number 4 of the great circle is the first visible, the conclusion is that it has been necessary for the intensity of the light at that moment to operate during four seconds in order to produce an effect in the camera-obscura; and if, on the other plate or paper, the first seven segments have remained black, and the eighth segment is the first upon which the light has operated, and the conclusion will be that the object-glass which has produced the effect on the first plate or paper has double the photogenic power of the other.

But if the geometrical progression has been followed, the same experiment will show the image of the segment No. 3 represented on one plate, and that of the segment No 4 on the other, as having each the first degree of intensity: and we have to draw the same conclusion as regards the power of each object-glass.

However, this conclusion would be exact only on the supposition, that the two plates were endowed with the same degree of sensitiveness: for if they had not been prepared identically in the same manner, we could not have the exact measure of the comparative power of the two object-glasses. The difference might be due, not to any difference in the power of the object-glasses, but to the inequality in the sensitiveness of the two plates; although, in repeating the experiment several times, the mean result might be sufficiently conclusive. But this difficulty has not escaped the inventor, and he has tried to avoid it. Being able, by means of the photographometer, to compare the sensitiveness of the two plates under the action of the same intensity of light, and during the same space of time, he availed himself of this instrument to determine beforehand the comparative sensitiveness of the plates which are to be used in the experiment with the dynactinometer. By this means we can try beforehand several couples of plates, and keep them as it were stamped with their degree of sensitiveness until we want to apply them to test the power of two lenses. The impression is made on one-half of the plate, leaving the other half for the image of the dynactinometer.

After having operated in the two camera-obscura, each supplied with the lenses the power of which we wish to compare, we submit the two plates, each impressed with both the photographometer and dynactinometer, to the vapor of mercury, which develops the two images on each plate.



The number of spots given by the photographometer, Fig. 47, will indicate the sensitiveness of the plate; and in comparing the two images given by the dynactinometer, accounting for the difference of sensitiveness of each plate, if there is any, we are able at once to determine the comparative power of the two lenses.

CHAPTER XVI.

ON THE POSSIBILITY OF PRODUCING PHOTOGRAPHS IN THEIR NATURAL COLORS.

Few speculations are more replete with interest than that of the probability of our succeeding in the production of photographic images in their local colors. M. Biot, a great authority, says,—“substances of the same tint may present, in the quantity or the nature of the radiations which they reflect, as many diversities, or diversities of the same order, as substances of a different tint; inversely, they may be similar in their property of reflecting chemical radiations when they are dissimilar to the eye; so that the difference of tint which they present to the eye may entirely disappear in the chemical picture. These

are the difficulties inherent in the formation of photographic pictures, and they show, I think, evidently, the illusion of the experimenters who hope to reconcile, not only the intensity, but the tints of the chemical impressions produced by radiation, with the colors of the objects from which these rays emanate." It may be remembered that two years since, Sir John Herschel succeeded in procuring upon photographic paper a *colored image* of the solar spectrum; and that eminent inquirer has communicated to me a recent discovery of great interest, which I have his permission to publish. "I have got specimens of paper," says Sir John Herschel, "*long kept*, which give a considerably better representation of the spectrum in its natural colors than I had obtained at the date of my paper (February 1840) and that light on a dark ground; but at present I am not prepared to say that this will prove an available process for colored photographs, though it brings the hope nearer." Here we have the speculations of one philosopher representing the productions of such pictures as hopeless, while the experiments of another prove these to be within the range of probabilities.

My own experiments have, in many instances, given me colored pictures of the prismatic spectrum, dark, upon a light ground, but the most beautiful I have yet obtained has been upon the daguerreotype iodinated tablets, on which the colors have at the same time, had a peculiar softness and brilliancy. Daguerre himself has remarked, that when he has been copying any red brick or painted building the photograph has assumed a tint of that character. I have often observed the same thing in each variety of photographic material, *i. e.*, where a salt of silver has been used. In the *Philosophical Magazine* for April 1840, will be found a paper,—"Experiments and Observations on Light which has permeated Colored Media,"—in which I describe some curious results on some of those photographs which are prepared with the hydriodic salts exposed to luminous influence with colored fluids superimposed; permitting, as distinctly isolated as possible, the permeation of the violet and blue, the green, the yellow, and the red rays, under each of which a complimentary color was induced. During January of the

present year, I prepared some papers with the bichromate of potash and a very weak solution of nitrate of silver; a piece of this paper was exposed behind four colored glasses, which admitted the passage respectively of, 1st, the violet, indigo, and blue rays; 2d, the blue, the green, and a portion of the yellow rays; 3d, the green, yellow, and orange rays; and, 4th, the orange and red rays. The weather being extremely foggy, the arrangement was unattended for two days, being allowed to lie upon a table opposite to a window having a southern aspect. On examining it, it had, under the respective colors, become tinted of a blue, a green, and a red: beneath the yellow glass the change was uncertain, from the peculiar color of the paper, and this without a single gleam of sunshine. My numerous engagements have prevented my repeating the observations I desire on this salt, which has hitherto been considered absolutely insensible to light.

The barytic salts have nearly all of them a peculiar colorific effect; the muriate, in particular, gives rise to some most rich and beautiful crimsons, particularly under the influence of light which has permeated the more delicate green leaves; and also in copying the more highly colored flowers, a variety of tintings having been observed. We may always depend on producing a photographic copy of a leaf of a green color by the following arrangement:—Having silvered a copperplate, place it in a shallow vessel, and lay thereon the leaf of which a copy is desired, maintaining it in its position by means of a piece of glass; pour upon it, so that the plate beneath the glass may be covered, a solution of the hydriodate of potash containing a little free iodine: then expose the whole to sunshine. In about half an hour, one of the most beautiful photographic designs which can be conceived is produced, of a fine green color. The fluid is yellow, and cuts off nearly all the chemical rays, allowing only of the free passage of the less refrangible rays; the most abundant being the yellow. This retards the process of solarization but it produces its complementary color on the plate.

These facts will, I think, prove that the possibility of our being enabled to produce colored photographs is decided, and that the probability of it is brought infinitely

nearer, particularly by Sir John Herschel's very important discovery, than it was supposed to be.

M. Edmund Becquerel has recently succeeded in obtaining bright impressions of the spectrum in colors, and copying highly colored drawings on metallic plates prepared with chlorine; and still more recently Mr. Hill, of New York, states that he has obtained more than fifty pictures from nature in all the beauty of native coloration. This process is not disclosed, but we are assured that it is a modification of the daguerreotype—one material, quite new, being introduced—and as soon as the manipulatory details are perfected, the whole is to be published.

CHAPTER XVII.

THERMOGRAPHY.

The curious nature of the results obtained by heat radiations, associated as they are with the chemical action of the solar rays, induces me to introduce it as a final chapter to this treatise on Photography, merely reprinting my original communication on the subject.

The Journal of the Academy of Sciences of Paris, for the 18th of July, 1832, contained a communication made by M. Regnault from M. Moser, of Königsberg, "*Sur la Formation des Images Daguerriennes*;"* in which he announced the fact, that "*when two bodies are sufficiently near, they impress their images upon each other.*" The Journal of the 29th of August contained a second communication from M. Moser, in which the results of his researches are summed up in twenty-six paragraphs. From these I select the following, which alone are to be considered on the present occasion:—

"9. All bodies radiate light even in complete darkness.

"10. This light does not appear to be allied to phosphorescence, for there is no difference perceived whether the bodies have been long in the dark, or whether they have been just exposed to daylight, or even to direct solar light.

"11. Two bodies constantly impress their images on each other, even in complete darkness.

"14. However, for the image to be appreciable, it is necessary, because of the divergence of the rays, that the distance of the bodies should not be very considerable.

"15. To render the image visible, the vapor of water, mercury, iodine, &c., may be used.

"17. There exists *latent light* as well as latent heat."

The announcement at a meeting of the British Association of these discoveries, naturally excited more than an ordinary degree of interest. A discovery of this kind, changing, as it did, the features, not only the theories of light adopted by philosophers, but also the commonly received opinions of mankind, was more calculated to awaken attention than anything which has been brought before the public since the publication of Daguerre's beautiful photographic process. Having instituted a series of experiments, the results of which appear to prove that these phenomena are not produced by *latent light*, I am desirous of recording them.

I would not be understood as denying the absorption of light by bodies; of this I think we have abundant proof, and it is a matter well deserving attention. If we pluck a nasturtium when the sun is shining brightly on the flower, and carry it into a dark room, we shall still be enabled to see it, by the light it emits.

The human hand will sometimes exhibit the same phenomenon, and many other instances might be adduced in proof of the absorption of light; and I believe, indeed, of the principle that light is latent in bodies. I have only to show that the conclusions of M. Moser have been formed somewhat hastily, being led, no doubt, by the striking similarity which exists between the effects produced on the daguerreotype plates under the influence of light, and by the juxtaposition of bodies in the dark, to consider them as the work of the same element.

1. Dr. Draper, in the Philosophical Magazine for September, 1840, mentions a fact which has been long known,—“That if a piece of very *cold* clear glass, or, what is better, a *cold* polished metallic reflector, has a little object, such as a piece of metal, laid on it, and the surface be breathed over once, the object being then carefully removed, as often as you breathe on it again,

* Comptes Rendus, tome xv., No. 3, folio 119.

a spectral image of it may be seen, and this phenomenon may be exhibited for many days after the first trial is made." Several other similar experiments are mentioned, all of them going to show that some mysterious molecular change has taken place on the metallic surface, which occasions it to condense vapors unequally.

2. On repeating this simple experiment, I find that it is necessary for the production of a good effect to use dissimilar metals; for instance, a piece of gold or platina on a plate of copper or of silver will make a very decided image, whereas copper or silver on their respective plates give but a very faint one, and bodies which are bad conductors of heat placed on good conductors, make decidedly the strongest impression when thus treated.

3. I placed upon a well polished copper plate, a sovereign, a shilling, a large silver medal, and a penny. The plate was gently warmed, by passing a spirit-lamp along its under surface; when cold, the plate was exposed to the vapor of mercury: each piece had made its impression, but those made by the gold and the large medal were more distinct: not only was the disc marked, but the lettering on each was copied.

4. A bronze medal was supported upon slips of wood, placed on the copper, one eighth of an inch above the plate. After mercurialisation, the space the medal covered was well marked, and, for a considerable distance around, the mercury was unequally deposited, giving a shaded border to the image: the spaces touched by the mercury [?] were thickly covered with the vapor.

5. The above coins and medals were all placed on the plate, and it was made too hot to be handled, and allowed to cool without their being removed; impressions were made on the plate in the following order of intensity,—gold, silver, bronze, copper. The mass of the metal was found to influence materially the result; a large piece of copper making a better image than a small piece of silver. When this plate was exposed to vapor, the results were as before. On rubbing off the vapor, it was found that the gold and silver had made permanent impressions on the copper.

6. The above being repeated with a still greater heat, the image of the copper coin was, as well as the others, most faithfully

given, but the gold and silver only made permanent impressions.

7. A *silvered* copper plate was now tried with a moderate warmth. Mercurial vapors brought out good images of the gold and copper; the silver marked, but not well defined.

8. Having repeated the above experiments many times with the same results, I was desirous of ascertaining if electricity had any similar effect: powerful discharges were passed through and over the plate and discs, and was subjected to a long-continued current without any effect. The silver had been cleaned off from the plate; it was now warmed with the coins and medals upon it, and submitted to discharges from a very large Leyden jar: on exposing it to mercurial vapor, the impressions were very prettily brought out, and, strange to say, spectral images of those which had been received on the plate when it was silvered. Thus proving that the influence, whatever it may be, was exerted to some depth in the metal.

9. I placed upon a plate of copper, blue, red, and orange colored glasses, pieces of crown and flint glass, mica, and a square of tracing paper. These were allowed to remain in contact half an hour. The space occupied by the red glass was well marked, that covered by the orange was less distinct, but the blue glass left no impression; the shapes of the flint and crown glass were well made out, and a remarkably strong impression where the crown glass rested on the tracing paper, but the mica had not made any impression.

10. The last experiment repeated. After the exposure to mercurial vapor, heat was again applied to dissipate it: the impression still remained.

11. The experiment repeated, but the vapor of iodine used instead of that of mercury. The impressions of the glasses appeared in the same order as before, but also a very beautiful image of the mica was developed, and the paper well marked out, showing some relation to exist between the substances used and the vapors applied.

12. Placed the glasses used above, with a piece of well-smoked glass, for half an hour, one-twelfth of an inch below a polished plate of copper. The vapor of mercury brought out the image of smoked glass only.

13. All these glasses were placed on the copper, and slightly warmed: red and smoked glasses gave, after vaporisation, equally distinct images, the orange the next, the others left but faint marks of their forms; polishing with Tripoli and putty powder would not remove the images of the smoked and red glasses.

14. An etching, made upon a smoked etching ground on glass, the copper and glass being placed in contact. The image of the glass only could be brought out.

15. A design cut out in paper was pressed close to a copper plate by a piece of glass, and then exposed to a gentle heat; the impression was brought out by the vapor of mercury in beautiful distinctness. On endeavoring to rub off the vapor, it was found that all those parts which the paper covered amalgamated with mercury, which was rubbed from the rest of the plates: hence there resulted a perfectly white picture on a polished copper plate.

16. The colored glasses before named were placed on a plate of copper, with a thick piece of charcoal, a copper coin, the mica, and the paper, and exposed to fervent sunshine. Mercurial vapor brought up the images in the following orders: smoked glass, crown glass, red glass, mica beautifully delineated, orange glass, paper, charcoal, the coin, blue glass: thus distinctly proving that the only rays which had any influence on the metals were the calorific rays. This experiment was repeated on different metals, and with various materials, the plate being exposed to steam, mercury, and iodine: I invariably found that those bodies which absorbed or permitted the permeation of the most heat gave the best images. The blue and violet rays could not be detected to leave any evidence of action, and as spectra imprinted on photographic papers by light, which had permeated these glasses, gave evidence of the large quantity of the invisible rays which passed them freely, we may also consider those as entirely without the power of effecting any change on compact simple bodies.

17. In a paper which I published in the *Philosophical Magazine* for October 1840, I mentioned some instances in which I had copied printed paper and engravings on iodized paper by mere contact and exposure to the influence of calorific rays, or

to artificial heat. I then, speculating on the probability of our being enabled, by some such process as the one I then named, to copy pictures and the like, proposed the name of THERMOGRAPHY, to distinguish it from Photography.

18. I now tried the effects of a print in close contact with a well-polished copper plate. When exposed to mercury, I found that the outline was very faithfully copied on the metal.

19. A paper ornament was pressed between two plates of glass, and warmed; the impression was brought out with tolerable distinctness on the under and warmest glass, but scarcely traceable on the other.

20. Rose leaves were faithfully copied on a piece of tin plate, exposed to the full influence of sunshine; but a much better impression was obtained by a prolonged exposure in the dark.

21. With a view of ascertaining the distance at which bodies might be copied, I placed upon a plate of polished copper a thick piece of plate-glass, over this a square of metal, and several other things, each being larger than the body beneath. These were all covered by a deal box, which was more than half an inch distant from the plate. Things were left in this position for a night. On exposing to the vapor of mercury, it was found that each article was copied, the bottom of the deal box more faithfully than any of the others, the grain of the wood being imaged on the plate.

22. Having found, by a series of experiments, that a blackened paper made a stronger image than a white one, I very anxiously tried to effect the copying of a printed page or print. I was partially successful on several metals: but it was not until I used copper plates amalgamated on one surface, and the mercury brought to a very high polish, that I produced anything of good promise. By carefully preparing the amalgamated surface of the copper, I was at length enabled to copy from paper, line engravings, woodcuts, and lithographs, with surprising accuracy. The first specimens produced exhibited a minuteness of detail and sharpness of outline quite equal to the early daguerreotypes and the photographic copies prepared with the chloride of silver.

The following is the process adopted by me, which I consider far from perfect, but

which affords us very delicate images:—

A well polished plate of copper is rubbed over with the nitrate of mercury, and then well washed to remove any nitrate of copper which may be formed; when quite dry, a little mercury taken up on soft leather or linen is well rubbed over it, and the surface worked to a perfect mirror.

The sheet to be copied is placed smoothly over the mercurial surface, and a sheet or two of soft clean paper being placed upon it, is pressed into equal contact with the metal by a piece of glass or flat board; in this state it is allowed to remain for an hour or two. The time may be considerably shortened by applying a very gentle heat for a few minutes to the under surface of the plate. The heat must on no account be so great as to volatilize the mercury.

The next process is to place the plate of metal in a closed box, prepared for generating the vapor of mercury. The vapor is to be slowly evolved, and in a few seconds the picture will begin to appear: the vapor of mercury attacks those parts which correspond to the white parts of the printed page or engraving, and gives a very faithful but somewhat indistinct image. The plate is now removed from the mercurial box, and placed into one containing iodine, to the vapor of which it is exposed for a short time: it will soon be very evident that the iodine vapor attacks those parts which are free from mercurial vapor, blackening them. Hence there results a perfectly black picture, contrasted with the gray ground formed by the mercurial vapor. The picture being formed by the vapors of mercury and iodine, is of course in the same state as a daguerreotype picture, and is readily destroyed by rubbing. From the depth to which I find the impression made in the metal, I confidently hope to be enabled to give to these singular and beautiful productions a considerable degree of permanence, so that they may be used by engravers for working on.

It is a curious fact that the vapors of mercury and of iodine attack the plate differently; and I believe it will be found that vapors have some distinct relation to chemical or thermo-electrical state of the

bodies upon which they are received. Moser has observed this, and attributes the phenomena to the colors of the rays, which he supposes to become latent in the vapor on its passing from the solid into the more subtile form. I do not, however, think this explanation will agree with the results of experiments. I feel convinced that we have to do with some thermic influence and that it will eventually be found that some purely calorific excitement produces a molecular change, or that a thermo-electric action is induced which effects some change in the polarities of the ultimate atoms of the solid.

These are matters which can only be decided by a series of well-conducted experiments; and, although the subject will not be laid aside by me, I hope the few curious and certainly important facts which I have brought before you will elicit the attention of those whose leisure and well-known experimental talents qualify them in the highest degree for the interesting research into the action of those secret agents which exert so powerful an influence over the laws of the material creation. Although attention was called to the singular manner in which vapors disposed themselves on plates of glass and copper, two years since, by Dr. Draper, Professor of Chemistry at New York, and about the same time to the calorific powers of the solar spectrum, by Sir John Herschel,* and to the influence of heat artificially applied, by myself, yet it is certainly due to M. Moser, of Konigsberg, to acknowledge him to be the first who has forcibly called the attention of the scientific world to an enquiry which promises to be as important in its results as the discovery of the electropile by Volta.

As to the practical utility of this discovery when we reflect on the astonishing progress made in the art of Photography since Mr. Fox Talbot published his first process, what may we not expect from Thermography, the first rude specimens of which exhibit far greater perfection than the early efforts of the sister art?

* Philosophical Transactions, Part 1., 1840, p. 50.

A NEW THEORETICAL AND PRACTICAL TREATISE
ON PHOTOGRAPHY UPON PAPER AND GLASS.*

BY GUSTAVE LE GRAY.

Translated from the French by J. R. Snelling, M. D.

CHLORIDE OF BARIUM.



THIS chloride is precipitated by dissolving carbonate of baryta in hydrochloric acid. The solution by evaporation yields crystals having the form of lamellar cubes.

We obtain quite agreeable tones by preparing a chloride of silver for the positive proofs with the aid of this salt. We manipulate in the same way and with the same proportions as with chloride of sodium. § 68.

When the proof has been exposed to the light sufficiently, it is washed in water containing ten per cent of sulphate of iron, which produces in the paper a white insoluble precipitate, imparting to the proof quite an agreeable aspect. After remaining in this bath for five minutes, we wash and continue to fix with the hyposulphite of soda in the same manner as for other preparations, and by replacing the sulphate of iron with chromate of potash, we obtain a golden yellow precipitate of a very warm tint.

CHLORIDE OF STRONTIUM.

§ 71. This salt is produced in the decomposition of the carbonate or sulphate of strontium by muriatic acid. As it is very deliquescent in air I do not recommend the use of it for the preparation of positive papers with chloride of silver. German and English operators, however, have recommended its employment.

It might be useful in a case where we have no other chloride at our disposal. I cannot too urgently recommend the photographer to consider well the operations he has to make, so that he may be able to reap advantage from every thing which he has at command, and thus to replace

whatever may be required for making an operation regular in its progress.

A profound study of the chemical agents, and of the theoretical part of the operations, conduces to this result.

ACID CHLORIDE OF GOLD.

§ 72. I prepare this acid chloride of gold by dissolving one part of gold, reduced to small pieces, in three parts of nitromuriatic acid (*aqua regia*) formed with one part of pure nitric acid at 36° and four parts of pure muriatic acid at 22°.

I make this solution in a porcelain capsule placed upon a sand bath, taking the precaution to cover it over with an inverted funnel, which forms a *chapeau* serving to prevent the loss of any parts by escapement. As soon as all the gold is dissolved, I put the liquid in a stoppered bottle, and dilute it with as many litres of water as there are half-grammes of metallic gold. There may still be added a few drops of nitric acid to give it more energy.

This solution serves to produce a very varied order of sharp tones upon positive proofs after they remain in the hyposulphite of soda and are washed in water for at least half an hour. To produce the desired effect, it is only necessary to place the proof in a basin containing a little of the solution, the action of which is under our control. Thus, a violet proof after it has been submitted to the hyposulphite of soda can be restored upon the acid chloride of gold to an intensely dark blue tint. The whites acquire at the same time a fresh brilliant tone very harmonious and warm.

With a proof slightly pushed to a yellowish brown color with the opposite scale of tints, we restore vigor to the less salted brown and almost black parts, and impart to the lights a very brilliant light golden tint.

When the desired tone is obtained, we

* Continued from page 287, Vol. 4, No. 6.

have only to plunge the proofs for a few minutes in water in order to fix it.

In the action of this reagent, the effect produced is, that this gold is precipitated of a black color upon the reduced oxides of silver, which are themselves changed to sulphite by the decomposition of hyposulphite of soda, which also is found in the proof. This action extends alike over the lights which it spoils, precipitating throughout an oxide of gold of a warm yellow color.

If you wish to use the ordinary chloride of gold found in commerce, you can render it suitable by adding to one gramme of chloride of gold per litre of distilled water, 5 grammes of *aqua regia*.

I recommend this method highly to the lovers of beautiful proofs.

HYPOCHLORITE OF POTASH.

§ 73. This product is found abundantly in commerce, and is obtained on this large scale by passing chlorine through a cold solution of carbonate of potash.

This solution diluted with as much again of water perfectly destroys the tints which spot the paper; it also fixes the proof perfectly, and imparts very agreeable tones.

The hypochlorite of lime produces the same effect.

We consequently obtain by these two bodies proofs in which the lights are well preserved.

I cannot too much enlist your services in the prosecution of experiments tending to the improvement of positive proofs, which have been heretofore a little too much neglected. The positive proof is the final result to which the whole attention of photographers should be directed, and we cannot too earnestly urge the necessity of seeking to perfect it to the greatest possible extent by imparting every desirable tint and modulation.

HYPOSULPHITE OF SODA.

§ 74. This salt is prepared by saturating hot and concentrated solution of sulphite of soda with flower of sulphur; then by evaporating it the salt is obtained in beautiful crystals of the prismatic form.

The solution of hyposulphite of soda is excellent to remove from the proofs sensitive matters which remain unaltered by light, chloride, iodide, bromide, cyanide, and flouride of silver, &c. It dissolves

them perfectly, and tends to form at the same time a sulphide of silver with the parts which have been reduced by the light. The formation of this sulphide is determined in a very energetic manner by the conjunction of hydrochloric, nitric, or acetic acid.

Solutions of hyposulphite of soda which are charged with the salts of silver, are more suitable than others for giving dark tints to proofs which have been fixed.

Hyposulphite of soda is the best fixative that can be employed, as well for negative as for positive proofs. The latter may acquire by its action alone every possible degree of tone, the richness of which in the hands of a skillful operator is unbounded.

When the positive proof is weak, it will be advisable to put it for a few hours in an ordinary water bath. It is thus freed from the soluble salt of silver, without so much as attacking the parts impressed by light, forming the blacks.

By this method, less time is afterwards required for the hyposulphite of soda, to remove the salts of silver not impressed, and the fixed image therefore will be found to possess more vigor than would be the case, were it put immediately into the hyposulphite of soda.

LIQUID AMMONIA.

§ 75. Ammonia or volatile alkali, is formed by the combination of hydrogen and nitrogen; it is obtained by decomposing sal ammoniac by quick lime. This product is found abundantly in commerce, and I shall not dwell further upon its manufacture.

The employment of ammonia in the preliminary preparations of the paper gives celerity to the formation of the image, since it hastens the metallic reduction of the silver by disengaging hydrogen occasioned by its decomposition. Unfortunately, this effect is a little too violent, almost always causing spots throughout the proof.

This body must also be employed with the greatest care, for it forms explosive bodies with silver, gold, iodine, and chlorine.

The fulminating silver is a black powder, produced by the combination of ammonia with oxide of silver. Caustic potash added to a solution of salt of silver in ammonia occasions its formation.

Fulminating gold is produced by pouring ammonia into a solution of chloride of gold. The precipitate is of a yellowish or brown color.

Iodide of nitrogen is produced by adding ammonia to a solution of iodine in chlorine and hydrochloric acid. It is even formed with iodide of potassium in certain cases of triple decomposition.

Chloride of nitrogen is formed by passing chlorine through a solution of hydrochlorate of ammonia, or any other ammoniacal salt. The liquid becomes yellow, and forms oleaginous drops which fall to the bottom and which are the chloride of nitrogen.

All these product detonates with violence at the least blow. Those who have not a profound knowledge of chemistry, will do well not to handle ammonia except with the greatest care.

Ammonia completely dissolves chloride of silver, it may therefore be successfully employed for fixing positive proofs, and very agreeable red tints may be thus obtained. These red tints may be brought back to the black color by gallic acid, and then fixed definitively by washing the proof in several waters.

AMMONIO CITRATE OF IRON.

§ 76. This salt is obtained by dissolving pure iron filings with citrate of ammonia. Let the filings digest until they are reduced one-half, renew with water, filter, and then evaporate to dryness. The residuum is the ammonical citrate of iron, presenting itself under the form of lamellar of a very intense granite tint.

Its solution in water, slightly concentrated, leaves upon the paper a very small pellicle sensitive to light. Chloride of gold, nitrate of silver, or gallic acid in solution develop the image which is formed by light.

Three or four minutes in the sun, with this paper are required to obtain a positive copy from a negative. Moreover, the formation of the image always depends upon the loss of oxygen. The iron is reduced to the least degree of oxidation and forms a black precipitate with gold, silver, or gallic acid.

PROTOSULPHATE OF IRON.

§ 77. This salt is prepared in the labo-

ratories by directly dissolving iron, in small particles, in diluted sulphuric acid. It is prepared in a larger scale by other processes.

A solution of this salt may be used for developing images formed upon fluoride of silver. A very weak solution answers for this purpose. We can also restore dark tones to the positive proofs with the same solution.

A negative rendered too dark by gallic acid may be brightened by submitting it to a bath slightly concentrated with a solution of protosulphate of iron, after fixing with hyposulphite of soda and washing it with water.

CAUSTIC POTASH.

§ 78. Caustic potash is found abundantly in commerce where it is manufactured on a large scale.

It attacks and dissolves animal matters.

It gives rapidity to the formation of the negative image by uniting in very small proportions with solutions of iodide of potassium and other bodies which are employed in the preliminary preparations of papers.

It also serves to precipitate protoxide of silver from the nitrate of silver solution.

A weak solution of caustic potash in water is excellent for giving variation of tones to positive proofs, after they are submitted to hyposulphite of soda, which are quite agreeable.

Proofs with a little too much depth, are likewise restored to pearly gray tints which are very harmonious.

Care should always be taken to watch the effect produced, for, being energetic, it might weaken the image more than would be desirable.

STARCH, AND OTHER SUBSTANCES, WHICH ANSWER FOR SIZING NEGATIVE PROOFS.

§ 79. Pure starch, dissolved in boiling water, is rendered insoluble in cold water by drying. This property of starch is useful for giving a perfect sizing to paper.

The most suitable starch for this operation is what I obtain by the boiling of rice the starch from which remains dissolved in the boiling water. It contains at the same time gluten which renders it better than the starch of commerce.

By adding the mucilage of linseed to the rice water described at § 7, in the proportion of one-third, a still firmer sizing is obtained.

Starch has a very great affinity for iodine, and almost always separates it from the base with which it may be united. This combination communicates a blue color to starch, and it is this property which enables us to recognise the presence of iodine in a liquid. Virgin wax has almost an equal affinity for iodine.

A hot solution of gelatine applied upon the paper at the same time as the iodide and other salts produces a sizing alike insoluble by cold water.

Albumen forms also an excellent sizing by the property which it possesses of becoming insoluble by heat (nearly 70 degrees,) by acids and by alcohol.

Inuline is also excellent for the preparation of paper. It is an amylaceous substance, which is usually extracted from the root of elecampane, by boiling this bruised root with distilled water and clarifying with the white of egg. Inuline settles upon cooling under the form of a white powder. This substance being almost entirely insoluble in cold water, and dissolving, in great quantity in boiling water, forms an excellent sizing by saturating the paper while hot with the preparation of iodide of potassium described at § 8.

The infusion of liquorice root being very rich in saccharine matter, the *glycyrrhizine* having the property of becoming insoluble by its combination with the acetic and other acids, may also be employed for the same purpose and give rapidity and delicacy to the proof.

The resins, camphor and fermented gluten dissolved in alcohol, form also excellent sizing by their insolubility in water.

Collodion possesses the same property. This preparation is obtained by plunging very clean and fine cotton in a mixture of three parts of concentrated sulphuric acid and two parts of nitrate of potash. After letting it remain in one or two hours it should be washed freely with water, and then dried at a temperature of 80 degrees at most. The product is partially dissolved in ether containing from 8 to 10 per cent. of alcohol. This solution bears the name of collodion, and answers very well as a sizing employed in the state of saturation

in alcohol in which the iodide and cyanide of potassium has been dissolved.

§ 80. As a general principle, although a sizing may be perfect for photographic papers, it is necessary that it should be dissolved in the same liquid which contains the preliminary preparations, and that it afterwards become, by drying, insoluble in other preparations to which it is to be submitted. Starch, inuline, glycyrrhizine (liquorice) gelatine, mucilage of linseed, sugar of milk, serum, animal and vegetable albumen dissolved in water, resins, camphor, fermented gluten and collodion dissolved in alcohol, possess these properties, and are therefore excellent.

Virgin wax, becoming permeable to liquids after a sojourn of some time in a bath of alkaline salts forms also one of the best sizings, without at the same time dispensing with the use of the others. It places the paper in a state perfectly adapted to receive the preparations, and admits of its receiving the action without alteration or injury.

Sugar of milk, which I first spoke of a long time ago, also possesses a very remarkable action upon the formation of the blacks of the proof, and is at the same time a good sizing.

Sugar of milk is produced by concentrating by heat the whey which is obtained in the manufacture of cheese. The liquid cooled and left to itself, deposits upon the walls of the vessels which contain it very hard crystals which are in thick layers.

This salt is most extensively manufactured in Switzerland.

DEXTRINE.

§ 81. Dextrine is starch deprived of its consistency and rendered soluble by boiling it with a small quantity of dilute sulphuric, hydrochloric or acetic acid. This is effected at a temperature of nearly a hundred degrees.

Dextrine is found very good in commerce. I make use of it to form a very suitable glue for pasting positive proofs on a sheet. This glue is extremely expeditious, very strong, easy to make at any moment, and does not spoil. To prepare it, it is only necessary to put a few inches of dextrine in cold water, in which it is perfectly dissolved. It is also used for dividing albumen, and gives it a little rapidity

dity to negatives ; but, it is necessary to be very careful, because an excess would tend to scale the albumen.

ANIMAL CHARCOAL.

Ivory Black.

§ 82. Animal charcoal is found abundantly in commerce, and is produced by calcining the bones of the ox, sheep and horse. I use it to decolorize the aceto-nitrate of silver which has served with albumen.

We have only to pour the aceto-nitrate of silver upon a tenth part by weight of animal charcoal, boil the whole for a short time in a porcelain capsule, and then filter. The liquid thus obtained is very clear, and constitutes a very complex salt of silver, which I have not yet had time to analyze, but which gives me, with iodized paper, very fine results for negative proofs.

During the printing of this treatise, I had occasion to try this product again, and it gave me results which were truly astonishing as well as rapid. By employing it with waxed and dry paper, I have obtained proofs in one third the time, as when operating with the fresh aceto-nitrate of silver. If this property is owing simply to the ingredients which leave the animal charcoal for the aceto-nitrate of silver, and which are, I think, the phosphates and carbonates, it would be even preferable to the fresh aceto-nitrate, since it would admit of great rapidity during the period of exposition. It would not be necessary to add anything to the aceto-nitrate of silver thus obtained after its ebullition for a short time upon the animal charcoal (nearly 16 minutes) and its filtration.

It will be advisable to employ it as it is found and absolutely in the same manner as directed at § 11.

Although we ought to make use of this aceto-nitrate of silver for the preparation of glass, it is, however, very necessary to add nearly a tenth in volume of crystallizable acetic acid, in order to better coagulate the albumen.

This liquid upon standing deposits slender crystals which I intend to analyze. They are probably composed of the phosphates and carbonate of silver.

Fresh nitrate of silver added to this so-

lution produces a very abundant precipitate.

CONCLUSION.

§ 83. I will conclude this review of the most useful photographic chemical agents, by describing some bodies not much examined as yet, and which may be appropriated for obtaining good results by a more profound knowledge thereof. The phosphate and carbonate of silver, the white precipitated hyposulphite of silver, formed by pouring a solution of hyposulphite of soda in nitrate of silver, are very sensitive to light. So also are the nitrate of bismuth, the iodide, chloride, bromide, and cyanide of gold, platina, and even lead. Bichromate of potash, succinic acid, the syrup of iodide of iron, and the red or protoxide of mercury may all become very powerful by a new application of accelerative agents.

I would also notice here in conclusion a very important enterprise, the foundation of a laboratory of chemical products especially for photographic purposes, under the direction of M. Puech, No. 15 Rue del' Arcade.

Photography is also indebted for this establishment to the noble exertions of Count de Montfort, founder of the Heliographic Society, a society which is destined to render immense services to photography.

In proportion as every country pays its tribute to our new art and multiplies the number of experiments, so will photography attain the last degree of perfection by adding extreme rapidity to the finish of execution.

Unfortunately, a false impulse has for some time been given to photography by able operators upon plates in Paris which tends to impede the progress of this art. These gentlemen seek for the proof on paper by means of retouching what they should obtain by chemical means. This remark on my part is made in kindness, and dictated by a love of art and a desire for its advancement. The retouching cannot exist upon the surface of the proof to which it is applied, unless it extends entirely over it, otherwise a spot would be formed and all harmony destroyed. If these gentlemen will renounce their false course and carefully examine the excellent chemical process which we possess, they will, with their skillful manipulation with the camera, be enabled to make them

yield perfect results without being subjected to the burdensome expense of their anti-artistic retouches. It is here that they should confine their efforts if they would soon have them crowned with complete success, nothing being more beautiful, nothing more charming than a fine proof of a portrait. I would again urge amateurs of photography to give all their attention to the dry process on waxed paper, which presents such great advantages that they should leave nothing neglected to make themselves masters of it.

All the proofs which I have made for three months, not only landscapes, but also portraits have been obtained by this method which gives me a certainty of execution so great, that it is seldom I am obliged to take a proof a second time.

Every one who would succeed with this process must entirely lay aside the mode in which he operated before, and follow exactly the directions which I have given in this treatise. It would be better to have the exposition in the camera too long rather than too short a time, not omitting to submit the proof to the gallic acid in which it would be well to pour nearly a tenth part in volume of aceto-nitrate of silver; then, when a successful trial has once shown the manner of operating, you will be enabled to diminish a great deal the time of exposition, and thereby arrive at perfect results.

The greatest care should also be taken

not to prepare in a bath of aceto-nitrate of silver a number of sheets larger than 25 to 35 centimes equal to the quantity in grammes of crystalized nitrate of silver employed. If this precaution be neglected the prepared sheets will need more sensibility, a sheet of this size absorbing for its preparation nearly a gramme of the nitrate of silver. Paper prepared with nitrate of silver, in order to be fit for use should be kept out of the light. It would do well to shut it in a book of blotting paper, and the whole enclosed in a covered box.

You should also avoid keeping the paper more than eight hours without using it; although it may still admit of a proof you will operate with less certainty and in general it is better to employ it after it has been prepared three or four hours especially in your first attempts.

I will recapitulate by recommending the use of dry paper in preference to others, care and neatness in the operations, a little economy in regard to the silk paper, and the blotting paper which serve to absorb the aceto-nitrate of silver, patience for developing the image with gallic acid, and much perseverance to buoy us up under one or more unsuccessful attempts. The manipulation and experience of this process being acquired, you will find yourselves amply repaid for the drawbacks and the perseverance necessary to them, and you will finally obtain beautiful results.

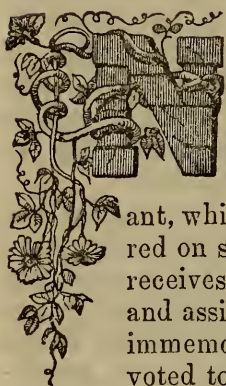
THEMOMOGRAPHY.

As a subject of pure scientific interest, themomography promises to develop some of those secret influences which operate in the mysterious arrangements of the atomic constituents of matter, to show us the road into the yet hidden recesses of nature's works, and enable us to pierce the mists which at present envelop some of the most striking phenomena which the penetration and industry of a few "chosen minds" have

brought before our obscured visions. In connection with photography, it has made us acquainted with subtle agencies working slowly but surely, and indicated physical powers beyond those which are already known to us, which may possibly belong to a more exalted class of elements, or powers, to which Light, Heat and Electricity, are subsidiary in the great phenomena of Nature.—*Hunt.*

THE VARIOUS USES OF THE DAGUERREAN ART.

Extract from a Manuscript Volume, soon to be published.



EW as the discovery of the daguerrean art is, and far as it is from having reached its destined perfection, the benefits are various and important, which it has already conferred on society. Nor, as the art receives that enlightened study and assiduous culture, which for immemorial ages have been devoted to its sister arts, can it be doubted, that these benefits will be vastly augmented. And as I would if possible, promote juster views than now prevail, whether in the public at large or among heliographic artists themselves, touching the legitimate claims of this art to consideration, I would crave my readers attention to some obvious suggestions as to its various uses.

I. In a world where incessant competition and struggle tend to produce a selfish egotism, whatever serves to vivify and strengthen the social sentiments should be hailed as a blessing to our race. Daguerreotype acts indirectly, but not the less powerfully to this important result. The moderate price of these sun-linnings, as compared with that of all previous portraits, has induced multitudes of all classes and degrees of culture to procure portraits of relatives and friends. In those breaking up of kindred and neighborly circles, so all but universal, these pictures become of peculiar utility. They are authentic representatives, left behind them by the absent, to keep their memories fresh and green; nor is it easy to measure their influence in counteracting the indifference and virtual alienation, which prolonged absence is so apt to create. With a transcript of the beloved features ever at hand, wearing the very expression which revealed the soul so plainly, we are scarce more likely to forget or grow cold to the original, than we should be in his corporeal presence. The importance of preventing the dying out of our loves and friendships and of

keeping our social affections alive and glowing, it were hardly possible to overstate; next to true religion itself they operate to preserve us from that self-involution and hardness of nature so often credited by advancing years with the painful struggles, the carking cares, and the bitter experiences of life. How, then, can we overprize an art which permits us to behold the all but living, speaking antitypes of beloved ones, though continents may now stretch or oceans roll between us.

Even greater still is its value, when the separation is by death, and we may not hope, on earth, to meet them more, we cannot count them utterly lost to us, while we may yet look on their pictured faces and forms, truthful and fresh as life itself, and inaccessible to the decay, which soon resolves their originals into dust. The remembrance of them, thus preserved to us, has a power to elevate and purify. The faults of the departed are forgotten, while their virtues shine for us more brightly than while they were with us. The tenderness with which death invests their image softens our hearts to an unwonted susceptibility to all virtuous impressions. At the same time it directs our thoughts to that awfully momentous event which has summoned our friends away and the mysterious world, into which it has ushered them; topics which, beyond all others, are deserving our regard, since they are connected with our own destiny not less than theirs.

II. Again, this art has already done much, and must hereafter do vastly more for the artistic education of the masses. Obviously, the first requisite for such education is, that its subject be enabled often and familiarly to inspect works of art. To a certain extent this condition is fulfilled by the immense number of daguerreotypes, which several hundred of professors are incessantly occupied in putting into circulation. True, many of these specimens are of indifferent quality; but none, perhaps, so utterly belie their own pretensions, as not to suggest to the beholder the

thought of art, so that the very poorest do somewhat towards waking to life the artistic capabilities: and as among things indifferent there are always a better and a worse, comparison is stimulated and taste and judgment receive something of discipline, causes apparently trivial often produce the most magnificent effects; and in defiance of ridicule, I venture to predict the coming of a day when results of highest national import may be traced to the simple fact of the heliographs so generally suspended at the entrance-doors of the daguerrean professors. Hundreds of persons of all ages and of every class, may be seen every hour of the day, stopping for a brief inspection of the specimens produced by different artists; and thus, unconsciously to themselves, they are acquiring at once a love of art and a capacity to discriminate between various styles and degree of excellence. And the susceptibility thus developed for one species of art, is naturally impressed by other species also, and the habit grows up of noting and enjoying the products of the pencil and the chisel: and ultimately the beautiful, the graceful, and the grand in form and color, wherever and however embodied, be it in the works of Man or of God.

I think it was Pericles, who said, "he found Athens of brick and left it of marble." Such, at any rate, was the fact; and from infancy the Athenian was trained artistically by Beauty in painting, sculpture and in architecture, and in manifold other shapes, on which his eye lighted constantly, whether abroad or at home. Where is the absurdity of beholding in the sun-linings, which arrest the passers' eye at so many points in our principal streets, the germ of an eventual development of art, which shall make the moderns the full peers of the ancients alike in creative genius and the ability to appreciate and enjoy? We see none.

While, however, daguerreotyping is in our view destined to exert an important influence in creating a general taste for the fine arts, we are equally confident it will do much for the improvement of those arts themselves. A good daguerrean portrait furnishes essential aid to the painter in transferring face and form to the ivory or canvass. By its means he is able not only to get a more exact general likeness of his

sitter, but to catch also his brightest and best expression. The daguerreotype, it will be remembered, is a *literal transcript* of its original, as the last named *appears at the moment*. An essential part of the daguerreotypist's skill is to act on his subjects' mind so as to call up its best mood, though it were only for a single instant. Then, as the transferring process is hardly less rapid than thought, he can seize the reflection of that mood in the face before it has vanished, either through fatigue or reaction. By such a daguerreotype the painter is, in various ways, aided in overlooking his own task. Thus he need not subject his sitter to the long, wearisome sessions formerly needful. A few brief sittings devoted exclusively to studying the subjects' type of mind and character, and so settling the fittest mode of expressing the same in the countenance, will fully suffice. For all other purposes, such as representing the drapery, &c., &c., the daguerreotype copy will serve, perhaps, even better than its living original. In a word, this use of the daguerreotype is a mode of *economising* both time and force, leaving to the painter more of both for producing the *highest effects* of the art.

The landscape painter, the sculptor, and architect, as well as all others, whose aim is visible representation, be their instrumentalities what they may, may also derive important help from daguerreotype copies of their originals. The majority of artists are beginning to recognise the value of daguerreotypes, as an auxiliary in their own spheres: and not a few of the most eminent among them use freely the facilities it offers. Nor do we doubt, that, with the advancement of the heliographic art, we shall witness a corresponding advance in the fine arts universally.

While, then, the benefits and the possible appliances of daguerreotype are so many and important, what a monstrous absurdity to regard the art itself as a mere process of *mechanical transcription*! rather should it be reckoned one (and that not the least) among the fine arts; and therefore not only opening a field for the exercise of high genius and large culture both artistic and general, but absolutely requiring these for great eminence therein.

It would seem superfluous to say, that the greater the ability and the more com-

plete the cultivation devoted to a pursuit, be this what it may, the more likely is eminence to be attained and success achieved in it. Stupidity and ignorance qualify their subject for distinction in nothing save themselves. And what is true of other pursuits is certainly not less true of the heliographic art. The ablest and most disciplined mind may find full scope for its energies both in the sciences lying at the basis of this art and in the manifold particulars of its practical department.

If to these appeals be added another, of which I have already spoken at some length in Chapter IV., even the dullest will hardly maintain, that mere mechanical aptness will answer all their requirements. And the wise and judicious will not hesitate to

declare, that to fulfil perfectly conditions so numerous and difficult might well tax to the uttermost the genius and the culture of Raphaël or Michael Angelo.

My purpose in presenting the foregoing suggestions—for which I do not venture to claim either novelty or depth—will have been more than accomplished, if they aid in rousing the daguerrean body to a stronger conviction of the dignity and value of their art and of the importance of devoting to it their best powers and most strenuous efforts. For them, as for all others, the true and the sole fitting maxim for guidance is “Excelsior.”

M. A. Root.

140 Chestnut Street, Philadelphia.

November 25, 1852.

THE COLLODION PROCESS IN PHOTOGRAPHY FOR THE PRODUCTION OF INSTANTANEOUS PROOFS.*

BY ALPHONSE DE BREBISSE.

Translated from the French by Mrs. A. L. Snelling.

EMPLOYMENT OF THE GUTTA PERCHA IN PHOTOGRAPHY.

Athenæum, 3d January.



At the last reunion of the photographic club, M. Fry has presented some charming designs upon glass obtained by a combination of gutta percha and collodion. We add to the common collodion, formed by a solution of gun cotton and ether, a small quantity of gutta percha, which is quickly dissolved.

This liquid is employed in the same manner as the ordinary process upon glass which makes the image appear by the pyro-gallic acid.

We can judge of the sensibility of this preparation by the following fact: A posi-

tive proof has been obtained by a negative plate in five seconds, by gas light. The film extended upon glass is much more adherent than that formed by the ordinary collodion or by albumen. We ought then to attend to the great discoveries made by M. Fry.

REMARKS OF MR. HUNT.

Athenæum, 3d January 1852.

In your number of the 20th last December Mr. Archer has communicated a result very interesting which he has obtained by the employment of the bichlorate of mercury upon some photographic proofs prepared with the collodion. The perfect designs of Mr. Archer have a great beauty, and his communication is of so much importance as to call attention to the effects which determine the action of the bichloride of mercury.

The reason of my addressing a letter to you, is to remind your readers that in 1840

* Concluded from Vol. 4, No. 5, page 293.

I discovered this property, and that it was made known in a memoir inserted in the *Philosophical Transactions*, and thus entitled: "Of the influence of the iodine to render some argentiferous compositions spread upon the paper sensible to the light, and of a new method of producing photographic images of a great clearness."

I extract from this memoir the following passages: I ought now to call attention to a remarkable phenomena, which offers a vast field for research. The extraordinary manner in which the vapor of mercury acts upon the metallic plates has given place to many studies and theories, but to me it appears less curious than the following discovery.

"If a sheet of paper prepared with the sulphur and the chloride of silver is plunged into a solution of bichloride of mercury, after having been exposed to the mercurial vapors, the design disappears, but after some minutes, we see it like magic, develop itself little by little, finer, and apparently whiter. Delicate traits at first scarcely perceived, are indicated, and show very distinctly and with rare perfection."

We see by this that the result is the same as that obtained by Mr. Archer. This discovery is also described in my *Researches upon Light*, p. 91. The action of the hyposulphite of soda, changing the effects produced by the corrosive sublimate, has been also indicated by me; but this observation had been already made by Sir John Herschel at the commencement of the same year.

I have no desire to attack the merits of Mr. Archer, who pursues with intelligence this subject full of interest and which renders such great services to the photography. I desire in the meantime, to preserve my rights upon the small number of discoveries that I have made. They are my only recompense for all my study and trouble.

ROBERT HUNT.

NOTE OF MR. FRY IN REPLY TO MR. ARCHER.

Athenæum, 17th January 1852.

Mr. Fry, on account of some observations having been made about his mingling gutta percha with collodion, says: Although the gutta percha does not quickly dissolve in collodion, there is enough of combination in the process in question to give to the sensible film a solidity such as

can dry the surface with a blotting paper in such a way as will draw the image either negative or positive in less than five seconds by gas light. If we shut up this collodion in a bottle with gutta percha we shall soon be convinced that this substance is easily soluble in the collodion.

Mr. Archer replies to the remarks of Mr. Hunt touching his experiments by means of corrosive sublimate placed upon the photographic paper, thus:

"I am far, says he, from seeking to diminish the merit of the photographic researches of Mr. Hunt, I shall be, on the contrary, the first to recognise it; but, in the present case, let me be permitted to say that before last Saturday, I was ignorant that a memoir upon this subject had been inserted in the *Philosophical Transactions*, and all my experiments have been made without knowledge of it. My first essays with the corrosive sublimate were neglected, not because the image got whitened, but on account of the blackening effect produced by the salt at the commencement of the action. This first effect of the bichloride of mercury upon the paper and upon the collodion is altogether different. Upon the first, the image is entirely effaced; upon the other the negative tone takes some effect, and this property is necessary to obtain a negative proof which is too weak, and arresting its action at the first moment.

THE PROCESS OF COLLODION.

BY M. J. BINGHAM.

London, March, 1852.

In the seventh number of *Photogenic Manipulation* the collodion is mentioned, among other substances, as having been employed by the author to form an adherent film upon a plate of glass to receive a sensible film with the iodide of silver, (Mr. Bingham) made several experiments with this substance in connection with Mr. Cundell. But these operators employed for developing the image simple gallic acid in place of pyro-gallic acid, but they could not then discover the principle which has since given so great a sensibility to collodion for portraits.

Scheele is the first who has produced the pyro-gallic acid by the sublimation of gall; it was then considered identical with the gallic acid. We can obtain it by heat-

ing some gallic acid in a small retort placed in a bath elevated to a temperature of 4.10° to 4.20° F. This preparation demands some care, and on this subject we refer to the excellent work of Doctor Stenhouse published in the *Memoirs of the Chemical Society* in 1842. We do not know who was the first to apply the pyro-gallic acid to photography.

The preparation called iodurated collodion is now found in commerce, and this saves much time and gives relief to inexperience. We will give the mode of preparation for those who wish to make it themselves, or who are unable to procure it.

Collodion being itself obtained from gun cotton, gives us the means of preparing this substance discovered by Dr. Schoenbien.

Take some prepared gun cotton, such as we use in polishing daguerreotype plates, and plunge it into a mixture made of equal parts of nitric acid s. g. 1-45, and of sulphuric acid s. g. 1-845; leave it in the bath three or four minutes, then put it into a vase where you wash it in water until it has no longer a trace of the acid. It ought then to be put into distilled water, then dried with blotting paper by a slow heat, not exceeding 212° F. To one ounce of gun cotton add seven ounces of sulphuric ether. When the solution is complete and the ether appears saturated, draw off the fluid through a linen rag. The collodion, a very mucilaginous substance too thick to be put thus upon a piece of glass, and should be diluted with an equal volume of ether.

We add 160 grains of crystallized nitrate of silver, in four ounces of water, and 160 grains of iodide of potassium in two ounces of water. In adding the solution of the iodide of potassium to that of silver, it forms a precipitate which is iodide of silver. Wash it, and dissolve it in a saturated solution of iodide of potassium. This solution which contains a double salt of iodide of silver, and of iodide of potassium is added to the collodion while it is stirred, which announces that it is sufficiently immured. The iodide of collodion is then complete, it is only necessary to leave it to rest until it becomes clear and transparent. It ought to be of a pale yellow color; if it is deeper, it announces

the presence of an acid in the ether or in the gun cotton.

In withdrawing the plate from the dark chamber, the image is not visible. We must make it appear with the following solutions:

Pyro-gallic acid, ... 2 grains.
 Crystalizable acetic acid, ... 1 drachm.
 Distilled Water, ... 1 ounce.

The mirror is placed horizontally upon a support of glass or porcelain; pour upon the surface the solution for making the image appear. After a time, add a drop or two of a solution of nitrate of silver of thirty grains to an ounce of water. The image quickly develops itself, and when it appears plainly, add the pyro-gallic acid and wash the plate in water. Afterwards treat the proof to a solution of hyposulphite of soda.

The plates upon collodion are more or less negatives by transparency and positive by reflection. This last effect is especially augmented by the addition of a small quantity of nitric acid.

We shall now add some modifications which have been effected from time to time in this process, by different amateurs. In place of the pyro-gallic acid, they employ the protonitrate and sulphate of iron.

In the December number of the *Practical Mechanics' Journal* is presented the following modification in the process of collodion. The author of the article pretends that the iodide of silver is not indispensable, and that the addition of the iodide of potassium alone, suffices to give by immersion in the nitrate of silver, the film of iodide of silver necessary.

To prepare the gun cotton, saltpetre is recommended in place of nitric acid. Equal volumes of sulphuric acid and saltpetre, form a convenient mixture in which the cotton is plunged seven or eight minutes. Iodide the collodion thus:

To the pure sulphuric ether, add an eighth part of its volume of alcohol, and a little of iodide of potassium (four or five grains to the ounce) then put in the gun cotton, agitate the whole and leave it to rest. The mixture of alcohol appears to be necessary to the collodion thus prepared, for we know, if we employ the pure ether that the sensible film is of no effect at the moment of the immersion in the ni-

trate of silver. On the other side, we ought to remark, that the alcohol added in too great a quantity, renders the film opaque and little sensible to the light. Then, if the light has had a little too much action, it is impossible to have a strong proof.

One cause of the difficulty of obtaining pure ether is that it almost always includes a portion of alcohol. I have been obliged to adopt the following method to obtain the ioduretted collodion: I add five or six grains of iodide of potassium to one ounce of ether. I shake it, and after some time of rest, I decant the ioduretted ether and dissolve in it the quantity of gun cotton necessary. I prepare a solution of iodide of potassium in the alcohol, and I mix in it a portion of the ioduretted collodion until the film, plunged in the nitrate of silver, has a white aspect, like milk; by this means, I can modify my collodion at the time it presents a convenient film.

Another modification consists in the preparation proper to develop the image. We know that they recommend the pyro-gallic acid for this operation, with an addition of acetic acid to preserve the whites not impressed by the light, from the action of the pyro-gallic acid. This effect is also produced by the other acids. I have never been able to obtain pure whites; this has led me to try the action of divers other acids, and I have found that the nitric acid fulfils the purpose. We experience a great difficulty in establish the proportions of the two acids, which led me to employ as a well known agent, the sulphate of iron, and the result which I have obtained by this means, has been very satisfactory. The relative proportions seems much less important, and with a little precaution we form a mixture very proper in the development of the image. I give the proportions which may be used with success:

Sulphate of iron..... 12 grains
Nitric acid,..... 1 or 2 drops.
Water, ... 1 ounce.

If by following with some degree of strength, often uncertain, of the nitric acid, the sulphate of iron attacks the sombre tints of the image, this danger will best be avoided by the addition of a little more acid.

POSITIVE PROOFS UPON GLASS BY COLLODION

Extract from the work "A GUIDE TO PHOTOGRAPHY" by M. Thornwaite, *London, May 1852.*

The little volume cited here, by M. Thornwaite, contains nothing particular upon the employment of collodion. We have only remarked a very simple means for obtaining positive proofs.

"Some positive images of great beauty are produced, if the mixture of pyro-gallic acid and the acetic acid commonly employed, is spread with an equal volume of distilled water, to which is added a small quantity of concentrated nitric acid, three drops to two drachms of pyro-gallic acid. When the proof has been fixed by the hyposulphite, wash and dry, lay over it some verdigris which protects the image and gives it more effect, and cover it with Japan varnish."

NEW INSTRUCTIONS BY MR. ARCHER.

Taken from his manual of the Collodion photographic process; by Fred. Scott Archer, *London: March 1852.*

The author of this work, Mr. Archer has been willing to permit me to extract from his publication some passages which may interest my readers. The extracts which I shall make are not as extended as they might be, for Mr. Archer recapitulates, in his work, the instructions which he has given before, and which I have in part set forth.

He does not prescribe determined proportions for the composition of collodion, the density of which, he knows, cannot be appreciated by these trials. It will be greater as there is more alcohol in its compositions.

Several diverse modifications of the process of Mr. Archer have been published for the preparation of the collodion with the iodide of silver, but they differ very little and do not offer any advantages.

A small quantity of bromine or of the fluoride of potassium or of arsenic acid, can be added to the solution.

If we can employ with advantage a stronger solution of the nitrate of silver, the preparation will have more sensibility. But this liquid will operate with the iodide of silver on the sensible film if we do not take care.

Mr. Archer employs the pyro-gallic

acid to make the images appear; in the meantime he announces that the protonitrate of iron produces the same result. He has found that a mixture of protonitrate of iron and of protosulphate of iron gives the most advantageous solution. But as it is easily decomposed, it is necessary to prepare it immediately before the operation.

This is the simple process:

Dissolve 40 grains of barytes in an ounce of water; then add 50 grains of protosulphate of iron pulverised, and the liquid becoming clear, will be ready to use. This will be a solution of protonitrate of iron, with a small quantity of sulphate of iron, to which we ought to add a half drachm of acetic acid to an ounce of the liquid.

Mr. Archer describes a dark camera of his invention, by means of which we can make proofs in open air. It is a box furnished with an object-glass large enough for the hands to be introduced by two openings furnished with extremities of india rubber, sticks being the holders, then in the shade of the light to execute the diverse manipulations which the appearance and the execution of the proof requires.

Without wishing to discuss the convenience of such a preparation we will remark, that M. Laborde has invented, not many years ago, a box analogous of which Mr. Archer has given a description in his *Manual of Photography*, page 331.

Mr. Archer purposes for transportation for excursions a large number of mirrors. In employing a collodion of such consistence that it can be used easily with the plate of glass. We can when the glass is fixed, apply upon the sensible film, a sheet of moist paper, then detach by means of another plate of

glass the edge of the collodion, roll the design with the paper upon a stick of glass which draws it out. The designs thus rolled and kept in a box, can be developed and stretched more slowly. By this process, one or two mirrors suffice on an excursion, to produce a large number of designs. Still, in his conclusion, Mr. Archer, in calling this process to mind, which he regards so useful to artists who wish to gain rapid proofs from nature, remarks that it is useless to practice this difficult manipulation when mirrors can be easily procured.

About the time this pamphlet was published, M. Bayard, known by his discoveries and his fine proofs, had made an improvement in the accelerating properties of collodion. Thanks to his courtesy, we can give some details upon this important modification.

When the mirror charged with collodion is taken out of the bath of azotate of silver and well drained, M. Bayard cools it rapidly upon the spot with a sensible film of the following liquids:

- | | |
|---------------------------|--------------|
| I. Pyro-gallic acid | 1 grain. |
| Distilled water, | 1000 grains. |
| Crystalizable acetic acid | 30 “ |
| II. Azotate of silver, | 3 grains. |
| Distilled Water, | 45 “ |
| Alcohol, | 15 “ |

Mix at the moment of the operation a part of the first solution with two parts of the second. After this rapid wash expose it in the dark camera a few seconds and then finish the operation already commenced, by pouring upon the plate the first solution.

LIFE OF GEORGE MORELAND.

BY A. CUNNINGHAM.



THE subject of our present biography was born in the Haymarket, London, on the 26th of June, 1763. He came of a race of painters. He was lineally descended from Sir Samuel Morland, an eminent mathematician and artist; his grandfather was a painter, and lived in the lower side of St. James's Square; and his father, Henry Robert Morland, after the failure of some extensive speculations, which all his biographers have alluded to, but left undescribed, followed the same profession, and painted, drew, and dealt in pictures with such indifferent success, that he became bankrupt, and was compelled to bring up his family of three sons and two daughters in indigence and obscurity.

It is said that the elder Morland sought to repair his broken fortunes by the talents of his son George—who, almost as soon as he escaped from the cradle, took to the pencil and crayon, and showed that he inherited art the natural way. The indications of early talent in others are nothing compared to his. At four, five, and six years of age, he made drawings worthy of ranking him among the common race of students; the praise bestowed on these by the Society of Artists, to whom they were exhibited, and the money which collectors were willing to pay for the works of this new wonder, induced his father to urge him on in his new studies—and his progress was rapid. But it is a dangerous thing to overtask either the mind or the body at these years, and there is every reason to believe that young Morland suffered both of these evils. His father stimulated him by praise and by indulgences at the table, and to ensure his continuance at his allotted tasks, shut him up in a garret, and excluded him from free air, which strengthens the body, and from education—that free air which nourishes the mind. His stated work for a time was making drawings from pictures and from plaster casts, which his father carried out and sold; but as he increased

his skill, he chose his subjects from popular songs and ballads, such as "Young Roger came tapping at Dolly's window," "My name it is Jack Hall," "I am a bold shoemaker, from Belfast town I came," and other productions of the mendicant muse. The copies of pictures and casts were commonly sold for three half-crowns each; the original sketches—some of them a little free in posture, and not over delicately handled, were framed and disposed of for any sum from two to five guineas, according to the cleverness of the piece, or the generosity of the purchaser. Though far inferior to the productions of his manhood, they were much admired; engravers found it profitable to copy them, and before he was sixteen years old, his name had flown far and wide.

But long before he was sixteen, he had begun to form those unfortunate habits by which the story of his life is to be darkened. From ten years of age he appears to have led the life of a prisoner, and a slave under the roof of his father, hearing in this seclusion the merry din of the schoolboys in the street, without hope of partaking in their sports. By-and-by he managed to obtain an hour's relaxation at the twilight, and then associated with such idle and profligate boys as chance threw in his way, and learned from them a love of coarse enjoyment, and the knowledge that it could not well be obtained without money. Oppression keeps the school of Cunning; young Morland resolved not only to share in the profits of his own talents, but also to snatch an hour or so of amusement, without consulting his father. When he made three drawings for his father, he made one secretly for himself, and giving a signal from his window, lowered it by a string to two or three knowing boys, who found a purchaser at a reduced price, and spent the money with the young artist. A common tap-room was an indifferent school of manners, whatever it might be for painting, and there this gifted lad was now often to be found late in the evening, carousing with hostlers and pot-boys, handing round the

quart pot, and singing his song or cracking his joke.

His father, having found out the contrivance by which he raised money for this kind of revelry, adopted, in his own imagination, a wiser course. He resolved to make his studies as pleasant to him as he could; and as George was daily increasing in fame and his works in price, this could be done without any loss. He indulged his son, now some sixteen years old, with wine, pampered his appetite with richer food, and moreover allowed him a little pocket money to spend among his companions, and purchase acquaintance with what the vulgar call life. He dressed him, too, in a style of ultra-dandyism, and exhibited him at his easel to his customers, attired in a green coat with very long skirts, and immense yellow buttons, buckskin breeches, and top-boots with spurs. He permitted him too to sing wild songs, swear grossly, and talk about anything he liked with such freedom as makes anxious parents tremble. With all these indulgences the boy was not happy; he aspired but the more eagerly after full liberty and the unrestrained enjoyment of the profits of his pencil.

During this feverish period he was introduced to Reynolds, obtained permission to copy some of his works, and began to be very generally noticed as an artist of no common promise. His father was his constant companion when he went out a-copying: more, it is said, though it can scarcely be believed, with the intention of seizing upon his productions, than with the desire of preserving him from loose associates, or the charms of the tap-room. He went to copy the painting of Garrick between Tragedy and Comedy in the gallery of Mr. Angerstein, at Blackheath; and the proprietor, a man of taste, and a lover of art, desired to view the work in its progress. The elder Morland declared that his son George had refused to begin his copy till it was promised that no one should overlook him, and that he should act in the house as he thought proper. This coarse arrogance was submitted to—young Morland refused all invitations to mix with the family of Angerstein—he descended to the servants' hall—emptied his flagon—cracked his wild jest, and was exceedingly happy.

How he escaped from the thralldom of his father has been related by Hassell and

by Smith; and as they contradict each other, I shall rehearse both accounts. The former, who knew Morland well, says, that "he was determined to make his escape from the rigid confinement which paternal authority had imposed upon him; and, wild as a young quadruped that had broke loose from his den, at length, though late, effectually accomplished his purpose." "Young George was of so unsettled a disposition," says Smith, "that his father, being fully aware of his extraordinary talents, was determined to force him to get his own living, and gave him a guinea, with something like the following observation: 'I am *determined* to encourage your idleness no longer; there—take that guinea, and apply to your art and support yourself.' This Morland told me, and added, that from that moment he commenced and continued wholly on his own account." It would appear by Smith's relation, that our youth, instead of supporting his father, had all along been depending on his help; this, however, contradicts not only Hassell, but Fuseli also, who, in his edition of Pilkington's Dictionary, accuses the elder Morland of meanly and avariciously pocketing the whole profits of his son's productions.

In the seventeenth year of his age he left his father's house, with his easel, his palette, his pencil—and dressed in his favorite green coat and top-boots. "He was in the very extreme of foppish puppyism," says Hassell, "his head, when ornamented according to his own taste, resembled a snow-ball, after the manner of Tippy Bob, of dramatic memory, to which was attached a short thick tail, not unlike a painter's brush." Thus accomplished and accoutred, with little money in his pocket, and a large conceit of himself, he made an excursion to Margate, with the two-fold purpose of enjoying *life* and painting portraits. His skill of hand was great—his facility, it is said, wondrous; while his oddity of dress, his extreme youth, and the story of his early studies attracted curiosity and attention—and sitters came—the wealthy and the beautiful. But the painter loved low company—all that was polished or genteel was the object of his implacable dislike. He had not patience to finish any portrait that he commenced, nor the prudence to conceal his scorn of his betters.

The man who could leave wealthy sitters to join in the amusement of a pig, an ass, or a smock race, was not likely to have such patrons long; and Morland returned to London with a dozen of unfinished portraits, on which he had received little or no money.

A well-known nobleman had heard of Morland's talents, and now commissioned him to paint a few pictures, for which he provided the subjects. This is a sort of drudgery which genius, if it consults its dignity, will seldom submit to; but when the subjects are "not particularly distinguished for their purity"—these are the words of Hassell—the commissions ought to be rejected with indignant loathing. To those commissions the biographer now cited hesitates not to impute that "particular distaste which he ever after evinced for the society of virtuous women;" and discovers in them "a reason why so striking a resemblance to the frail sisterhood is found in the female subjects which occur in some of his productions." Let his lordship answer for real and not imaginary sins. Morland had moved too long in gross company to leave the honor of polluting his mind to any one of the peerage. He had become ere this the boon companion of hostlers, pot-boys, horse jockeys, money-lenders, pawnbrokers, punks, and pugilists. With these comrades he roamed the streets and made excursions by land and water; the ribald jest, the practical joke, and scenes coarse and sensual, formed long ere now the staple of his life.

Amid all this wildness and dissipation, his name was still rising. He valued his pencil as the means of acquiring not distinction, but the gold wherewith to charm away creditors and liquidate tavern bills. The pictures which he dashed off according to the craving of the hour, are numerous and excellent. They are all fac-similes of low nature—graphic copies of common life—their truth is their beauty, and if they have anything poetical about them, it lies in the singular ease and ruminating repose which is the reigning character of many. Pigs and asses were his chief favorites; and if he had stolen them, or dealt in them, as one of his rustic admirers declared, he could not have painted them better. The sheep on the hill, the cattle in the shade, and the peasant superintending the econo-

my of the barn yard, the piggery, or the cow-house, shared also largely in his regard. He was likewise skillful in landscape—not in that combination of what is lovely or grand, over which a poetical mind sheds a splendor that anticipates paradise; but in close, dogged fidelity, which claims the merit of looking like some known spot where pigs prowl, cattle graze, or asses browse. At this period he lodged in a neat house at Kensall Green, on the road to Harrow, and was frequently in the company of Ward, the painter, whose example of moral steadiness was exhibited to him in vain.

While he resided at Kensall Green, he fell in love with Miss Ward—a young lady of beauty and modesty—and soon afterward married her; she was the sister of his friend the painter; and to make the family union stronger, Ward sued for the hand of Maria Morland, and in about a month after his sister's marriage obtained it. In the joy of this double union, the brother artists took joint possession of a tolerable house in High Street, Marylebone. Morland suspended for a time his habit of insobriety, discarded the social comrades of his laxer hours, and imagined himself reformed. But discord broke out among the sisters concerning the proper division of rule and authority in the house; and Morland, whose partner's claim perhaps was the weaker, took refuge in lodgings in Great Portland Street. His passion for late hours and low company, restrained through courtship and the honeymoon, now broke out with the violence of a stream which had been dammed in rather than dried up. It was in vain that his wife entreated and remonstrated—his old propensities prevailed; and the postboy, the pawnbroker, and the pugilist, were summoned again to his side, no more to be separated.

Before the rupture of his brotherhood, Ward made some engravings from the pictures of Morland, which obtained the notice of Raphael Smith, an engraver of talent and enterprise, who knew the town, and felt the value, and foresaw the popularity of those productions. Under his directions Morland painted many pictures from familiar scenes of life; Smith engraved them with considerable skill, the prints had a sale rapid beyond example, and no-

thing stood between the painter and fortune but his own indiscretion. "Those works," says Hassell, "showed that he had a wonderful facility in seizing those propitious coincidences—those light, ornamental, and minute proprieties and graces, which contribute such an ample store to the genuine stock of original composition of consummate art. The harmonious combination of his back grounds, his drapery, ever natural and decorous, without confusion or perplexity ; his children, also, his sheep, his horses, his pigs, and all the appendages of the rural landscape, including every other department of picturesque scenery, are still classed among the finest of modern productions, are still objects of imitation to young students, and are still considered and exhibited by the best judges and patrons of the fine arts, as most remarkably neat, correct, and elegant views of nature."

In those days, before folly had entirely fixed him for her own, Morland loved to visit the Isle of Wight, and some of his best pictures are copied from scenes upon the coast. A rocky shore—an agitated surf—fishermen repairing their nets and careening their boats, or disposing of their fish, generally formed part of his pictures. He was ever ready too to join them in their labor, and more so in the mirth and carousal which followed. A friend once found him at Freshwater-gate, in a low public-house called *The Cabin*. Sailors, rustics, and fishermen were seated round him in a kind of ring, the roof-tree rung with laughter and song ; and Morland, with manifest reluctance, left their company for the conversation of his friend. "George," said his monitor, "you must have reasons for keeping such company." "Reasons, and good ones," said the artist, laughing, "see, where could I find such a picture of life as that, unless among the originals of *The Cabin*?" He held up his sketch-book and showed a correct delineation of the very scene in which he had so lately been the presiding spirit. One of his best pictures contains the fac-simile of the tap-room with its guests and furniture.

The early management of his father had made the whole swarm of picture-dealers, cleaners, and copiers acquainted with Morland's value, and, what was far more unfortunate, had let them into the secret of his personal tastes. They knew his love of

low company, his delight in the bottle, and his desire to enjoy the passing moment, whatever expense it might incur ; and some of them were ever at his elbow to lay down the gold for present pleasures, upon the understanding that the pencil should clear off the debt. His absurd aversion to decent company naturally aided the views of those sordid miscreants ; they applauded his vulgar prejudice as true independence, and pushed about the jest, apparently at the expense of "the fine people," but really and truly at the cost of the unhappy Morland, who sat in idea sole monarch of the realm of free and unshackled art. These wretches affected a vice to which they were strangers ; they put on the aspect of prodigality, and with the determination in their heads of exacting a bitter percentage for this condescension, accompanied him on his country excursions, made up his drinking parties, and attended at his painting-room with a purse in one hand and a bottle in the other. "It frequently happened," observes one of his biographers, "when a picture had been bespoke by one of his friends, who advanced some of the money to induce him to work, if the purchaser did not stand by to see it finished, and carry it away with him, some other person, who was lurking within sight for that purpose, and knew the state of Morland's pocket, by the temptation of a few guineas laid upon the table, carried off the picture. Thus all were served in their turn ; and though each exulted in the success of the trick when he was so lucky as to get a picture in this easy way, they all joined in exclaiming against Morland's want of honesty in not keeping his promises to them."

Those honest sufferers were not without their remedy. The picture which they purchased for five guineas sold readily for twenty ; one guinea's worth of liquor was often repaid by a sketch which brought ten ; and if that was insufficient, they employed some dexterous and unprincipled limner to make fac-similes of the most popular of Morland's works, which they found people rich enough and ignorant enough to buy as originals. "I once saw," says Hassell, "twelve copies from a small picture of Morland's at one time in a dealer's shop, with the original in the centre ; the proprietor of which, with great gravity and

unblushing assurance, inquired if I could distinguish the difference." With reptiles such as these, genius ought never to come into communion; it must be confessed, however, that Morland was not incommode in his intercourse with them by any over-righteous notions as to money matters. In the course of the years 1790, 1791, and 1792, when his cleverest pictures were painted, the admiring dealers swarmed round him with offers of pecuniary assistance to any amount. George put his hands into their pockets without the least ceremony. He was a joyful borrower, and took whatever was offered without scruple or hesitation. He made no nice distinctions; for he accepted them all, and he held out to all the pleasing prospect of seven-fold remuneration from the pencil.

The evil consequences of all this required no prophetic spirit to foretell. It was in vain that his wife, a woman of sense and beauty, endeavored to reclaim him; equally vain was the interposition of his friends; who were only laughed at when they assured him that a life of unmeasured conviviality, and habits of incalculable profusion, must injure his skill of hand and his capacity of intellect, and immure him, sooner or later, in a prison. His fine constitution triumphed for a time over the ordinary results of debauchery, and his knowledge of the town and active adroitness in avoiding tipstaffs kept him long from acquaintance with the jail. It is probable, indeed, that those to whom he was indebted were more willing to alarm him than actually take his liberty from him; they knew that confinement could not hasten the payment, that the estate out of which their money was to come was of the mind; and, what was equally serious, it could be turned over to a new swarm of dealers in pictures, who would inherit all their profits.

Having received an invitation from Claude Lorraine Smith, a gentleman of Leicestershire, he suddenly vanished from the constant watchfulness of those creditors, carrying with him a trusty friend and five-bottle debauchée, whose neglect of the toilet had obtained him the name of Dirty Brookes. His entertainer, an artist himself and an encourager of art, was also wealthy and hospitable, and Morland was received with great kindness; even Dirty

Brookes was an object of attention and solicitude. It is true, that the artist, in the midst of Mr. Smith's company, was sometimes heard to sigh for the rougher freedom of the ale-house, and lamented to his bosom friend that so much good wine should be drunk without loud mirth and merry song, and in accordance with an etiquette distasteful to the convivial notions of hostlers and pugilists. He found some consolation, perhaps, in accompanying Mr. Smith to the fox-chase, or at last in the conviviality which at evening rewarded the devotees of that rough pastime; and it is reported that both he and Dirty Brookes regained the reputation which they lost by day in the chase, through their prowess over the bottle by night. He found time, however, to make some sketches of Leicestershire scenery, which he afterwards wrought into pictures.

His sudden disappearance from London excited general alarm in the whole righteous race of picture-dealers; no one knew what had become of him, and a waggish companion insinuated that he was gone to France. Some of those men had advanced money or bespoke pictures; others had paid money upon works begun, and the interest of the whole was concerned: it would be only misleading the reader to say that Morland felt at all anxious respecting them. To him the completion of such commissions was a matter of total indifference; he knew that these patrons had doomed him to constant slavery, that they merely looked upon him as an engine which augmented their incomes, and of which they had only to keep the wheels oiled. When he reappeared, the gloom passed from their looks, and they hastened to share in the spoils arising from his paintings of the scenery of Leicestershire.

Yet wild and imprudent as he was, and sunk in almost constant debauchery, his skill seemed only to augment, and his rapidity of execution to increase. Indolence cannot be ranked among his sins. Pleasure he found could not be purchased without money; his companions were not followers of an empty purse, and even Dirty Brookes himself, who fell a sacrifice in sharing Morland's excesses, was more moderate in his mirth when he was in danger of settling the reckoning from his pocket. To get money, it was necessary to work; and certainly during his brief career he

wrought diligently. Four thousand pictures, and most of them of great merit, which he left to continue his name, tell us that, with the sharp sword of necessity at his back, he labored as diligently and successfully as if he had lived in wealth and in honor.

During this period Morland lived at Paddington, where he was visited by the popular pugilists of the day, by the most eminent horse-dealers, and by his never-failing companions the picture-merchants. He was a lover of guinea-pigs, dogs, rabbits, and squirrels; he extended his affection also to asses. At one time he was the owner of eight saddle-horses, which were kept at the White Lion; and that the place might be worthy of an artist's stud, he painted the sign where they stood at livery with his own hand. He wished to be thought a consummate judge of horse flesh and a dealer in the article. But he was taught that his wisdom did not lie in that way by two or three sagacious horse-jockeys, and began to find that all the cunning of the island was not monopolized by the picture-dealers. For indifferent horses he paid with excellent pictures; or, what was worse, with bills which he was not always, if ever, prepared to take up; and when due, purchased an extension of the time by the first picture he had ready. His wine-merchant too was in the discounting line, and obtained sometimes a picture worth fifty pounds for similar accommodation. "He heaped folly upon folly," says Hassel, "with such dire rapidity, that a fortune of ten thousand pounds per annum would have proved insufficient for the support of his waste and prodigality."

He was as vain as he was prodigal; was anxious for the smiles of the meanest of mankind; and as for flattery, any one might lay it on with a trowel. At the grossness of his humor all the hostlers laughed, and he that laughed loudest was generally rewarded with a half-crown or a pair of buckskin breeches little the worse for wear. His acquaintances on the north road were numerous; he knew the driver of every coach, and the pedigree of the horses, and taking his stand at Bob Bellamy's inn at Highgate, would halloo to the gentlemen of the whip as they made their appearance, and treat them to gin and brandy. "Frequently," says one of his

biographers, "he would parade, with a pipe in his mouth, before the door of the house, and hail the carriages as they passed in succession before him; and, from being so well known, was generally greeted in return by a familiar salute from the postilion. The consequence he attached to this species of homage was almost beyond belief."

He once (we are told) received an invitation to Barnet, and was hastening thither with Hassell and another friend, when he was stopped at Whetstone turnpike by a lumber or jockey cart, driven by two persons, one of them a chimney-sweep, who were disputing with the toll-gatherer. Morland endeavored to pass, when one of the wayfarers cried, "What! Mr. Morland, won't you speak to a body!" The artist endeavored to elude farther greeting, but this was not to be; the other bawled out so lustily, that he was obliged to recognise at last his companion and crony, Hooper, a tinman and pugilist. After a hearty shake of the hand, the boxer turned to his neighbor the chimney-sweep, and said, "Why, Dick, don't you know this here gentleman? 't is my friend Mr. Morland." The sooty charioteer smiling a recognition, forced his unwelcomed hand upon his brother of the brush; they then both whipped their horses and departed. This rencounter mortified Morland very sensibly; he declared he knew nothing of the chimney-sweep, and that he was forced upon him by the impertinence of Hooper; but the artist's habits made the story be generally believed, and "Sweeps, your honor," was a joke which he was often obliged to hear.

Raphael Smith, the engraver, had employed Morland for years on works *from* which he engraved, and *by* which he won large sums of money. He called one day with Bannister the comedian to look at a picture which was upon the easel. Smith was satisfied with the artist's progress, and said, "I shall now proceed on my morning ride." "Stay a moment," said Morland, laying down his brush, "and I will go with you." "Morland," answered the other, in an emphatic tone, which could not be mistaken, "I have an appointment with a *gentleman*, who is waiting for me." Such a sarcasm from such lips, from a Smith to a Morland, might have cured

any man who was not incurable ; it made but a momentary impression upon the mind of our painter, who cursed the engraver, and returned to his palette.

His love of horses, once great, gradually subsided ; he at length studiously refused any intercourse with the worthy fraternity of horse-dealers, not because he felt that they had cheated him as often as he risked making a bargain, but because he had found another method of disposing of his pictures. He now retired to some secluded place, set up his easel, dashed off a few paintings, and entrusted them to the care and the conscience of a bosom crony, whose business it was to dispose of them in the most profitable market. The claim which this associate had upon his confidence was confirmed by many a deep and prolonged carousal, nor is there reason to believe that the man failed to do his best ; he returned with the money ; it was instantly melted into gin and brandy.

All his early pride of dress gradually vanished ; his clothes were now mean, his looks squallid, and when he ventured into the streets of London, he was so haunted by creditors, real or imaginary, that he skulked rather than walked, and kept a look out on suspicious alleys and corners of evil reputation. If he saw any one looking anxiously at him, which many must have done out of compassion for the wreck which folly had wrought with genius, he instantly imagined him a creditor, and fled like quicksilver, for he was in debt to so many that he dreaded duns in every street. Harrassed by incessant apprehensions of arrest, he shifted from place to place ; and before the close of his career, was acquainted with every spot of secrecy or refuge within the four counties which surround the metropolis. One day, wearied with perpetual changing of abode, he took his crony with him to make a regular inspection of the King's Bench Prison. They were conducted over that strange scene, which still remains exactly as it is described by Smollett, and departed with a lively conviction that such quarters as Hatchway and Tom Pipes coveted so earnestly would be worse than any our painter had yet experienced. The squalors of *the Bare*, however, left no impression strong enough to alter his conduct.

On one occasion he hid himself in Hack-

ney, where his anxious looks and secluded manner of life induced some of his charitable neighbors to believe him a maker of forged notes. The Directors of the Bank despatched two of their most dexterous emissaries to inquire, reconnoitre, search, and seize. These men arrived, and began to draw lines of circumvallation round the painter's retreat ; he was not, however, to be surprised ; mistaking those agents of evil mien for bailiffs, he escaped from behind as they approached in front, fled into Hoxton, and never halted till he had himself in London. Nothing was found to justify suspicion, and when Mrs. Morland, who was his companion in this retreat, told them who her husband was, and showed them some unfinished pictures, they made such a report at the Bank, that the Directors presented him with a couple of bank-notes of twenty pounds each, by way of compensation for the alarm they had given him.

The sad estate into which he had fallen made any story of his distress be believed, and before his death, as well as after, "anecdotes of Morland the painter," were regularly manufactured for newspapers and magazines. "He was found," I copy these words from Fuseli's edition of Pillington. "He was found at another time in a lodging in Somer's Town, in the following most extraordinary circumstances : his infant child, that had been dead nearly three weeks, lay in its coffin : in one corner of the room an ass and foal stood munching barley straw out of the cradle ; a sow and pigs were solacing themselves in the recess of an old cupboard, and himself over a beautiful picture that he was finishing at his easel, with a bottle of gin hung upon one side, and a live mouse sitting for its portrait on the other." I must, however, abate the pathetic of this scene. Morland lived and died childless ; consequently, the infant dead in the coffin, and the ass and its foal eating straw out of the cradle, must be dismissed from the group.

It may be safer to select a few anecdotes from Hassell, his intimate friend. This person's first introduction to Morland was in character. "As I was walking," he says, "towards Paddington on a summer morning, to inquire about the health of a relation, I saw a man posting on before me with a sucking-pig, which he carried in

his arms like a child. The piteous squeaks of the little animal, and the singular mode of conveyance, drew spectators to door and window; the person, however, who carried it minded no one, but to every dog that barked—and there were not a few—he set down the pig, pitted him against the dog, and then followed the chase which was sure to ensue. In this manner he went through several streets in Mary-le-bone, and at last, stopping at the door of one of my friends, was instantly admitted. I also knocked and entered, but my surprise was great on finding this original sitting with the pig still under his arm, and still greater when I was introduced to Morland the painter.”

A mutual friend, at whose house Morland resided when in the Isle of Wight, having set out for London, left an order with an acquaintance in Cowes to give the painter his own price for whatever works he might please to send. The pictures were accompanied by a regular solicitation for cash in proportion, or according to the nature of the subject. At length a small but very highly finished drawing arrived, and as the sum demanded seemed out of all proportion with the size of the drawing, the conscientious agent transmitted the piece to London and stated the price. The answer by post was, “Pay what is asked, and get as many others as you can at the same price.” There is not one sketch in the collection thus made but what would now produce thrice its original cost.

One evening Hassell and some friends were returning to town from Hampstead, when Morland accosted them in the character of a mounted patrol, wearing the parish great-coat, girded with a broad black belt, and a pair of pistols depending. He hailed them with “horse patrol!” in his natural voice; they recognised him and laughed heartily, upon which he entreated them to stop at the Mother Red Cap, a well known public-house, till he joined them. He soon made his appearance in his proper dress, and gave way to mirth and good-fellowship. On another occasion he paid a *parishioner*, who was drawn for constable, to be permitted to serve in his place; he billeted soldiers during the day, and presided in the constable’s chair at night. At another time, having promised to paint a picture for M.

de Calonne, he seemed unwilling to begin, but was stimulated by the following stratagem. Opposite to his house in Paddington was the White Lion; Hassell directed two of his friends to breakfast there, and instructed them to look anxiously towards the artist’s windows and occasionally walk up and down before the house. He then waited on Morland, who only brandished his brush at the canvass and refused to work. After waiting some time, Hassell went to the window, and affected surprise at seeing two strangers gazing intently at the artist’s house. Morland looked at them earnestly—declared that they were bailiffs, who certainly wanted him—and ordered the door to be bolted. Hassell, having secured him at home, showed him the money for his work, and so dealt with him that the picture was completed, a landscape and six figures, one of his best productions, in six hours. He then paid him, and relieved his apprehensions respecting the imaginary bailiffs: Morland laughed heartily. He considered it as a kind of pleasant interruption to the monotony of painting and drinking, that he was apprehended as a spy at Yarmouth, and subjected to a sharp examination. The drawings which he made on the shores of the Isle of Wight were considered as confirmations of guilt; he was honored therefore, with an escort of soldiers and constables to Newport, and there confronted by a bench of justices. At his explanation they shook their heads, laid a strict injunction upon him to paint and draw no more in that neighborhood and dismissed him. On another occasion, he was on his way from Deal, and Williams, the engraver, was his companion. The extravagance of the preceding evening had fairly emptied their pockets; weary, hungry, and thirsty, they arrived at a small alehouse by the way-side; they hesitated to enter. Morland wistfully reconnoitred the house, and at length accosted the landlord—“Upon my life, I scarcely knew it; is this the Black Bull?” “To be sure it is, master,” said the landlord, “Ay! the board is there, I grant,” replied our wayfarer, “but the Black Bull is vanished and gone. I will paint you a capital new one for a crown.” The landlord consented and placed a dinner and drink before this restorer of signs, to which the travelers

did immediate justice. "Now, landlord," said Morland, "take your horse, and ride into Canterbury—it is but a little way—and buy me proper paint and a good brush. He went on his errand with a grudge, and returned with the speed of thought, for fear that his guests should depart in his absence. By the time that Morland had painted the Black Bull, the reckoning had risen to ten shillings, and the landlord reluctantly allowed them to go on their way; but not, it is said, without exacting a promise that the remainder of the money should be paid with the first opportunity. The painter, on his arrival in town, related this adventure in the Hole-in-the-Wall, Fleet Street, a person who overheard him, mounted his horse, rode into Kent, and succeeded in purchasing the Black Bull from this Kentish Boniface for ten guineas.

A bailiff, more subtle than his brethren, succeeded in arresting Morland. Fallen as he was, and discovered by the officer wallowing in a sty of filth and debauchery, his talent still found him friends, by whose recommendation and influence he obtained the Rules of the Bench. "This ill-fated artist," says Hassell, "seemed to have possessed two minds—one, the animated soul of genius, by which he rose in his profession—and the other, that debased and grovelling propensity, which condemned him to the very abyss of dissipation." In his new abode of misery, among the wreck of proud fortunes and high hopes, in the company of some whom prodigality had utterly ruined, and of others who had only retired hither that they might live in affluence in spite of their just creditors, Morland was found by Hassell; he was not only content, but like Tam O'Shanter in his glory, conceived himself victorious over all the ills of life. Even here he could jest and revel, indulge the wildest whims, and luxuriate in oddities and caprices.

Even amid misery and recklessness like this, the spirit of industry did not forsake him, nor did his taste or his skill descend with his fortunes. One day's work would have purchased him a week's sustenance; yet he labored every day, and as skillfully and beautifully as ever. His favorite companion in his retreat was a waterman, whom, by way of distinction, Morland

called "My Dicky," and Dicky was now the established vender of his pictures. If chance detained the purchaser of a bespoke painting beyond the time he promised to send for it, "My Dicky" was instantly despatched with it to the pawnbroker's. Dicky once carried a picture wet from the easel, with a request for the advance of three guineas upon it. The pawnbroker paid the money; but in carrying it into the room his foot slipped, and the head and fore parts of a hog were obliterated. The money-changer returned the picture with a polite note, requesting the artist to restore the damaged part. "My Dicky!" exclaimed Morland, "and that's a good one! but never mind!" He reproduced the hog in a few minutes, and said, "There! go back and tell the pawnbroker to advance me five guineas more upon it; and if he won't, say I shall proceed against him; the price of the picture is thirty guineas." The demand was complied with.

For Spencer of Bow-street he painted several pictures; one of the best was a straw-yard; it had evidently cost him some pains, and he was no lover of minute work. He had introduced accordingly a raven seated on a straw-rack, and written on the rail under its feet, "No more straw-yards for me, G. Morland." The multitude of his orders induced him to neglect the finishing of many of his pictures, and the purchasers, glad to get them as they were, employed some second-rate hand to glaze up the foreground; "But this," observes Hassell, "was confined to picture-dealers, whose skill lay in supplying half-worn landscapes with new skies, and in cracking and varnishing new historical pictures to produce the appearance of antiquity." His common price, when in confinement, was "four guineas per day with his drink;" and his employer sat down beside him telling pleasant stories and pouring out liquor till the time expired. It often required some skill to obtain a good day's work; for the glass was apt to be in his fingers in the morning before the pencil, and he continued to handle both alternately till he had painted as much as he pleased, or till the liquor got the better when he claimed his wages, and business closed for the day.

He had no wish however to be distin-

guished as resident in the realm of dur-
ance: taking advantage of the liberty of
a day-rule in term time, he borrowed a
horse—rode from house to house among
his friends in the country round London
—contradicted boldly the story of his im-
prisonment—returned to town at the spur,
and exhibited himself at every low pot-
house on his way to the Rules. His vanity
soared not beyond the present moment;
to make a good passing impression was his
chief aim; and while his money lasted, he
was sure of success among those whose ap-
plause he valued. Though well descended
he regarded that matter little, and would
rather have had the laugh of a pot-house
on his side than all the emblazonments of
heraldry. In his earlier and better days,
a solicitor informed him that he was heir
to a baronet's title, and advised him to as-
sert his claim. I know not whether there
was any real foundation for this lawyer's
story. "Sir George Morland!" how-
ever, said the painter, "it sounds well,
but it won't do. Plain George Morland
will always sell my pictures, and there is
more honor in being a fine painter than in
being a fine gentleman."

When the Insolvent Debtor's Act at
length restored him to liberty—he was al-
most past the power of enjoying it. His
constitution was ruined, and, his personal
character was sunk into general contempt.
No one would associate with him but the
meanest of mankind, nor did he wish this
otherwise. In his thirty-ninth year, the
palsy struck him. He recovered partially,
but would often fall back senseless in his
painting chair, and sometimes sink into
sleep with his palette and brush in his
hand. His left hand was so much affected,
that he could no longer hold the imple-
ments of his profession. He was not, how-
ever, dismayed; he made drawings in
pencil and in chalk, tinted them lightly,
still enriched the country with works at
once bold, original, and striking, and seem-
ed to set want and disease at defiance.
But the swiftest runner is soonest at the
end of his journey. Morland was carried
for debt to a spunging-house in Air-street,
and to strengthen his courage on the loss
of his liberty, swallowed an unusual quan-
tity of spirits, which instead of stupefaction,
produced fever. Attwell, the keeper of
the house, became alarmed, and applied to

his friends for assistance: their sympathy
if exerted—of which there is no proof—
came too late; the powers of life were ex-
hausted, and he died, after a brief illness,
in utter wretchedness and penury, in the
fortieth year of his age. His wife, from
whom he had been separated for some
time, in consequence of family feuds, sur-
vived him only a few days.

Morland had a look at once sagacious
and sensual, and the same friends who
compared his forehead to that of Napoleon,
represent him as vain and irritable, fretful
and vindictive. His character as a man
was essentially vulgar, and he seemed in-
sensible to shame. He loved all kinds of
company save that of gentlemen; it gave
him pain to imitate the courtesies and de-
cencies of life, and he disliked accordingly
all those whose habits required their ob-
servance. He married without being in
love, and treated his wife with careles-
ness, because he was incapable of feeling
the merits of modesty or domestic worth.
He had fits of profuse generosity and ca-
pricious affection; but folly and grossness
were his familiar companions.

As an artist Morland's claims to regard
are high and undisputed. He is original
and alone; his style and conceptions are
his own; his thoughts are ever at home—
are always natural—he extracts pleasing
subjects out of the most coarse or trivial
scenes, and finds enough to charm the eye
in the commonest occurrence. He never
points above the most ordinary capacity,
and gives an air of truth and reality to
whatever he touches. He has taken a
strong and lasting hold of the popular
fancy; not by ministering to our vanity,
but by telling plain and striking truths.
He is the rustic painter for the people:
his scenes are familiar to every eye, and
his name is on every lip. Painting seemed
as natural to him as language is to others,
and by it he expressed his sentiments and
his feelings and opened his heart to the
multitude. His gradual descent in society
may be traced in the productions of his
pencil; he could only paint well what he
saw or remembered; and when he left the
wild seashore and the green woodside for
the hedge ale-house and the Rules of the
Bench, the character of his pictures shifted
with the scene. Yet even then his wonder-
ful skill of hand and sense of the pictur-

esque never forsook him. His intimacy with low life only dictated his theme—the coarseness of the man and the folly of his company never touched the execution of his pieces. All is indeed homely—nay, mean—but native taste and elegance redeem every detail. To a full command over every implement of his art, he united a facility of composition and a free readiness of hand perhaps quite unrivalled.

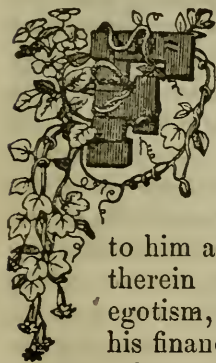
His pictures were most produced under the influence of intoxication, and the strong stimulant of immediate payment;

they were painted in the terror of want, and in the presence of the sordid purchaser, who risked five guineas in a venture for twenty—yet they want nothing which art can bestow, or the most fastidious eye desire. Such was the precious coin with which this unfortunate man paid for gin, obtained the company of the scum and feculence of society, and purchased patience from his creditor or peace from the tipstaff. The annals of genius record not a more deplorable story than Morland's

COMMUNICATION ON THE HILLOTYPÉ.

BY MERCURY.

[The writer of the following communication has left his name with us for the benefit of those interested.—*Ed. Pho. Art-Journal.*]



RIEND SNELLING— Since the publication of Mr. L. L. Hill's letter in the Daily Times, of Oct. 26, I have been expecting that some of our daguerreotypists would reply to him and repel the silly charges therein set forth—show up his egotism, and the desperate state of his finances, which I think is the sole cause of this last "*pronunciamiento*"—as they would call it down in Mexico. One of his first whippers is, that "attempts are being made both in this country and in Europe to supersede me." Now this is a willful perversion of truth, or, to say, the least of it, a lamentable ignorance of the fact that Daguerre himself labored hard for a number of years to produce pictures in colors. So did Sir H. Davy, Becquerel, Herschel, Niepce, and a host of others, long before Mr. Hill thought of daguerreotyping. He would have us believe, that the *idea* of daguerreotyping *colors* originated with him.

Again: "fear of injuring the daguerreotype business has prevented me from vindicating my name," and so forth. His name needs no vindication. We are all willing to admit that it is fully and firmly established. He can't injure the business now let him try ever so hard—he has cried "wolf" once too often. I may as well say, however, in order to show how much he has our interests at heart, that his letter in the Times was published in direct opposition to the wishes of several of our most influential daguerreotypists, who, having heard of his intention to publish, begged him not to do it, as it might do them serious injury. He did publish, however, in the very face of their remonstrances! I look upon his excuses for publishing as very lame indeed. There was no cause for it, except his want of money, and as he expects to get that from the daguerreotypists, he should have published his letter in Snelling's or Humphrey's Journal, whose columns are always open to him. But a limited number of readers wouldn't satisfy his gigantic ambition; nothing but a world-wide notoriety can content him, and I hope he'll get it. Nor can I see any reason for the subterfuges resorted to in that letter, except to gain time—to pettifog—to transfer the dollars

from the pockets of the "raw ones" into his own by a slight of tongue, known to ancient Wizards as "Presto!" "Agreement!" "Change!" but modernized by this mountain magician into "Books!" "Gold!" Quick "Stuff!". Such jugglery is so unworthy a man of genius—is so far beneath the *discoverer of a great law*, that I cannot for the life of me reconcile the one with the other. Ah! well, as Mrs. Partington would say, great minds are made up of a conglomerated mass of heterogeneous particles, and Mr. Hill is certainly a man of immense magnitude, and huge preponderosity, but I fear his "child of light" will, at no distant day, discombulate his fobnolix without any compunctious scruples of conscience. But, in all seriousness, what confidence can be placed in a man who tells so many different stories as Mr. Hill has told. His acts don't tally with his tales. He says he is almost penniless, and asks us to buy his books and chemicals in order that the—vide grandiloquent letter in the Times—profits may afford him a sustenance; yet, how extravagant in him to pay seventy-five dollars to the Times newspaper for publishing a couple of columns of fulsome, self adulation? This is a practical illustration of political economy—reversed. If he is poor in purse he is rich in metaphor. Two years ago he told us how many pictures he had made with every color complete, and that in making them he had not experienced "*even a partial failure*" that any daguerreotypist of ordinary ability, could, after being shown how, make Hillotypes as easily as daguerreotypes. Now, he informs us his process is very difficult, that he makes a great many failures, and, speaking through Professor Morse, he says, that none but those who excel as daguerreotypists can ever make anything out of his process; that none but men possessing high artistic talent can reach even mediocrity in Hillotyping. While speaking of Professor Morse, I beg leave to say, that I entertain too high an opinion of him to think him a party in this, to my mind, disreputable affair. No; I believe his credulity has been imposed upon, his feelings appealed to on the plea of poverty, and in this way he became involved. It is to be regretted, however, that the man whose name is every hour pronounced by the thunder's tongue, the

man who chained down the lightning and made a pack-horse of it, should become the trumpeter of this worse than "water gas" bubble. Mr. Hill intimates that if we would benefit by his discovery, our purses must always be open to him—we must receive as gospel truth everything he tells us, no matter how strongly it smacks of Monchausenism. We must never doubt, O! no, for by faith alone can we be saved, and that we must be pinned to his sleeve, while he reserves to himself the absolute right of looking upon us as so many thieves, only waiting a favorable opportunity to filch from him his alledged discovery. He hints, too, that if we "bleed freely" our names shall be placed upon his book for favorable consideration, but no matter how liberally we "shell out" we mustn't grumble if we get nothing. Honest, isn't it? Now, I opine, that his idea of selling his discovery to just such persons as he pleases, and keeping it exclusively in their hands is ridiculously absurd; for the parties that buy of him will sell to others, and he can't prevent it. And if he patents it everybody can use it and snap their fingers at him, for the patentee must *prove* that you are using *his* discovery or invention contrary to law, before he can obtain an injunction against you; and what operator is going to admit people into his chemical room, or show them whether he is using Mr. Hill's process or his own. If Mr. Hill has made the discovery, which I doubt, let him patent it, and my word for it, it wont bring him five thousand dollars. I believe he has some *hokus pokus* impracticable plan of coloring pictures, which is utterly useless from the length of time required in doing it and the uncertainty attending its success. But that he produces colored pictures in the way in which he says I don't believe, nor will I, until some one *sees* him do it, and I believe no one has as yet. I am not in favor of robbing Mr. Hill of the fruits of his discovery, (if discovery he has) on the contrary, if he has what he claims, he is justly entitled to an immense fortune, and a name immortal, and I, for one, will do all in my power to secure him both, the moment I can have proof of the truth. As to the certificates, I look upon them as so many pieces of blank paper, for I believe the gentlemen who gave them were deceived. Besides,

I judge from the style in which they are written, that many of them were penned by Mr. Hill himself. Perhaps he keeps a supply on hand, and simply asks his visitors to sign them, which they do because they can't very well decline after having partaken of his hospitality.

I now make Mr. Hill the following proposition, which, if accepted, will effectually settle the whole matter; and, if he has truth on his side, will secure him "material aid" from every daguerreotypist in the country.

Edward Anthony, and M. M. Lawrence, are men well known to Mr. Hill, and to every reputable daguerreotypist in the United States. They are known and esteemed, as men of rigid honesty and virtue.* Let Mr. Hill take one or both of these gentlemen into his operating-room, and let them see him prepare a plate entirely in their presence, or as far as he can with due regard to the safety of his discovery. Let him then make a picture of one of them upon that plate and show it to them, and if they will say that the natural colors were on that plate, not one daguerreotypist in the United States will doubt the fact.

I propose further, so that Mr. Hill shall have nothing to fear. It is, that both of these gentlemen be sworn by a Justice of the Peace or a Commissioner of Deeds, not to reveal nor make use of, in any way, any secrets they may learn from Mr. Hill, or by observation, nor in any way make use of any information they may obtain in connection with this visit, that would tend to injure Mr. Hill or his interests, other than a true report of what is above specified. Said report to be published.

This I think a fair proposal, and if Mr. Hill has what he claims, he will not refuse its acceptance. If he declines it, it will be proof positive to me that he's trifling. Should he accept it, and the report be favorable, he will once more have the good will of every daguerreotypist throughout the length and breadth of the land; nor will funds be wanting to enable him to carry on his experiments, for every photographer in the country will cheerfully give

him "aid and comfort" without asking for any return.

It is due to the daguerreotypists that Mr. Hill should make some such demonstration as this. They promptly responded to his first "appeal;" many of them bought great numbers of his books, simply to aid him. They virtually gave him their money, for his book contains nothing but what they all knew perfectly well themselves; and, yet, he is going to give us a new edition for which he wants us to subscribe liberally. A few words as to the value of his book. I want to show the estimate in which it ought to be held according to his own statements. In the first edition, page 105, he says, "My pictures are fully equal to those of Root, Brady, Lewis, Meade, Johnson, and other first class operators," and not more than two months ago he told Mr. Beckers of this city, that he was such an inferior operator, that if he should attempt to make pictures in opposition to the New York daguerreotypists he'd starve. Which of the above stories are we to believe? What is the value of a book emanating from such a source? Can Mr. Hill tell us anything about daguerreotyping that we don't know? I think not. Then, why purchase more of his books? Several of the daguerreotypists of this city have stacks of his former edition on hand, for which they paid him three dollars a copy, and which they would gladly sell for fifty cents. Not content with that, he wants them to buy more. Well, perhaps they will!

I understand that Mr. Hill has recently addressed a letter to a prominent daguerreotypist of this city, saying, that he has had *some* orders from the country but *none* from New York, and asks, why it is that the New Yorkers don't "walk up to the captain's office?" Whether the gentleman "appealed" to can give the desired information or not I don't know. But I think I can. The solution of the problem lies in the simple fact, that we of New York, have seen a few specimens of the "*genus homo*" (some people call it "seeing the elephant") known in this community as "Confidence Men"—a very industrious, but unappreciated class of individuals, and, I fear, entirely unknown to our country brethren. Alas! that their education should have been so sadly neglected.

* I trust these gentlemen will excuse the liberty I take with their names. I name them for the reasons given above, and because they are in no way mixed up with the certificates.

I think, Mr. Editor, that for one, I have said enough, and as you have invited communications upon this subject, as I see by the last Journal, for the purpose of bringing out the sentiments of the daguerreotypists towards Mr. Hill, you will doubtless have many responses more worthy of insertion than mine. The only thing that I can say in favor of the forgoing is, that "*them's my sentiments*," honest and "above board," that I have "set down nought in malice," and shall be but too happy to make the "*amende honorable*" when Mr. Hill shows the world that he has done right.

In conclusion, I would respectfully remind Mr. Hill, that he cannot run riot through the world and have everything his own way. Complaints about a "glaring injustice having been done him" is all moonshine, and comes from him with a

very bad grace. If anybody tried to do him an injustice, it was in self-defence—because of his own bombastic "blabativeness," through the press, which has so materially injured our business for the last two years. His first announcement swept like a thunder-bolt over the land, and caused a complete stagnation of business, and his *periodical bulletins* tend to keep it stagnant. *He knows this to be the fact*, and still if we make an effort to throw off the incubus, he whines like a whipped child, and complains to the world "that a glaring injustice has been done me." Let him accept my proposal, and thereby silence *forever* all opposition, and make all men his friends. Mr. Hill—look into your own heart, and see if you are blameless. Ask yourself if you have done right.

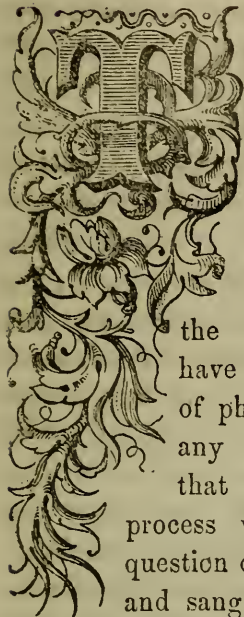
MERCURY.

A NEW AND IMPORTANT INVENTION.

The latest effort of invention, in the way of art, is one of singular beauty, called the Crystalotype, invented and patented by John A. Whipple, of Boston, and brought to this city and now in practice by Root, the well-known Daguerrean Artist, No. 363 Broadway. The Crystalotype is a method of taking likenesses upon glass and paper, so that when finished they present all the beauty of an actual painting with the unerring accuracy of the daguerreotype likeness. The process is easy, and when one picture is made, hundreds of copies may be taken—thus in a measure rivalling the steel-plate press. The most perfect and beautiful copies of single buildings, whole streets, broad fields and land-

scapes, are taken by this method, showing every line and feature, every hill and vale, stick and stone, with an excellency far exceeding any species of drawing, the whole picture presenting all the appearance of a rich mezzotint engraving. For the purposes of art, where perfect accuracy of drawing is necessary or desirable, and for perpetuating portraits, family scenes, homesteads, &c., in the compact form of plate engravings, the Crystalotype will be of remarkable value. Specimens of these pictures may be seen and pictures obtained at Mr. Root's Gallery of Daguerrean Art, Broadway, corner of Franklin-street.—*N. Y. Tribune.*

GOSSIP.



TWO years have now rolled away since the appearance of the first number of the Photographic Art-Journal, and during that time more discoveries — nearly all of them of the highest importance — have been made in the art of photography than during any former period. At that time, the daguerrean process was the all-absorbing question of interest—the hopeful and sanguine, the sensible man and the learned, looked forward to important improvements, while the vulgar and ignorant pronounced it perfect, and incapable of further modifications. The former have had their desires, in a measure, verified, while the latter, too self-satisfied, and egotistical to seek for the instructions of their superiors, are still plodding along in the old beaten track, and making as miserable abortions now as six years ago.

But a new era has dawned upon photography. The paper processes have been brought to such a degree of excellence, that the minds, not only of our daguerreans but of the public, are turned to them with a degree of attention of the most absorbing nature. A large number of our first artists have already commenced the practice of the art, and many others are making enquiries preparatory to entering the field.

We anticipated this result months ago. The ruinously low prices to which daguerreotypes have fallen, and the horde of men, wholly incapable of appreciating the excellence or beauty of the process, or of judging of the quality of their work, has

made it a matter of self-defence on the part of the really talented and artistic operators to turn their attention to that branch of the photographic art which precludes the possibility of being affected in like manner by such a class of men, for as it requires far more talent and scientific knowledge, it is almost a moral impossibility for such harpies to understand, much more practice it, and the chances are, that those who can succeed in paper manipulation, will obtain both fair remunerative prices, and greater celebrity.

To review thoroughly the many improvements in the photographic art which have been given to the public during the last two years, would occupy more space, at this time, than our publisher has allotted to us, and we shall therefore content ourselves with glancing at some of the most important of the discoveries and applications of Evrard, Le Gray, Renard, Macaire, Becquerel, Niepce, Hunt, Archer, Whipple, and Hill, which stand foremost. The exertions and self-sacrificing industry of these men, in the art, have been the means of giving to the world (we must except Mr. Hill, for he has not yet given to the world anything but “*self-satisfied*” assurances, pamphlets and certificates) processes which must eventually work wonders not only in photography, but in the fine arts generally.

The paper processes, of Evrard, Le Gray, Renard, Becquerel, and other French philosophers, are more or less modifications of the same principles, but these various modifications are in themselves highly important to the full development of the art, and to give that pleasing variety of tone and finish which is necessary to an avoidance of that monotony so repugnant to good taste, harmony and natural effect.

From all accounts, however, it appears to have been reserved to Mr. Archer and Dr. Wood of England to make the greatest discovery yet perfected in photogenic drawing upon paper, and their collodion processes bid fair to become, not only the most successful but most popular of any yet invented—until such times as the Heliocromatype and Hillotype are brought to the same degree of success.

In the daguerreotype art we have the wonderful discoveries of M. Macaire of France, and Mr. Hill, of our own country, neither of whom, however, have, as yet, seen fit to make their inventions public. They have, notwithstanding, been the all absorbing source of conversation and argument for the last eighteen months, with all who are interested in the art.

The crystalotype of Mr. Whipple of Boston, also bids fair to become an important acquisition. The results of the process, that we have seen, are very good, and we are pleased to see that it has been adopted by several who have entered the field of paper manipulation. This invention has been patented by Mr. Whipple, and the process may be obtained by application to him.

We must not forget two or three discoveries added to the daguerreotype process by Messrs. Dorat, Hesler and Hunter, for cleaning the plate. It is true they do not partake of that greatness which appertains to some of those before mentioned, but they are really intrinsically valuable to the daguerrean artist, and will effect all that is claimed for them, which every one, who is conversant with the cleaning operation, would acknowledge, were they to try the experiment. Another invention of the same class by another of our artists, we can recommend as very useful, particularly to those operators who meet with so many failures—we allude to “Wood’s Gilding Dissolvent,” which enables the operator to

clean a plate, that has been gilded, as effectually as a new one.

“That photography is destined to work a great revolution in the world of art” is becoming more and more evident every day. Among its wonders is its application to lithography and wood engraving. M. V. Prevost has recently arrived in New York from Paris, accredited by M. M. Lerebours and Le Grey, for the purpose of pursuing their recent discoveries of taking photographs upon lithographic stones, and printing from them, and of also taking them upon wood for engravers. Processes of this nature were discovered four or five years ago, but not sufficiently perfect for practical use. We now understand, from M. Prevost, that this desideratum has been accomplished, and that he will shortly be enabled to exhibit some of his pictures printed from stones photographed by himself. He is fitting up a room in this city for the purpose.

— As we expected, Mr. Hill has—by his last publication—injured himself exceedingly in the estimation of the daguerrean public. Men who were his staunch friends previously have become agrieved, and we will venture to say without fear of contradiction, that there is scarcely an artist in Boston, New York, or Philadelphia, who has not lost confidence in him and his alledged discovery. An obstinate self-will, and a foolish ambition, is only worthy of such a state of feeling. The most liberal offers—we may say the most magnificent that ever were proposed to man—have been made to him, and, notwithstanding his continual whine about poverty, he refuses. And why? Simply because it is his desire to perfect the discovery himself—an ambitious wish certainly, and one which under some circumstances would do him credit—but he must be aware, as well as many who know him well, that he is not,

scientifically, competent to the task of perfecting an accidental discovery such as the one he has made, for that it was an accidental one we have had from his own lips, his assertions in print to the contrary, notwithstanding. We will admit that no one has a right to oblige Mr. Hill to make his discovery known, and we defy him to point to an individual who has attempted to do so. But has Mr. Hill a right to jeopardize the business of thousands of his fellow-men in order to gratify a foolish ambition? Is not this treating them as enemies rather than as friends? A colonel, at the head of his regiment, is allowed the privilege of slaying as many men as he possibly can to gain possession of a fort, and gratify his ambition for promotion and renown, because it is for the good of the state to which he belongs, and those he kills are its and his enemies, but is Mr. Hill willing to submit his chances of reputation and renown upon the same principle? Suppose the colonel should turn traitor, flee to the enemy, and by the most daring acts of bravery destroy the fortifications of his countrymen, would his success meet—even among his new allies—with that distinguished fame which he sought? He has sacrificed his friends and his country to a foolish ambition—probably for no other reason than that it was by them justifiably curbed—and in consequence receives their most violent execrations. In this light do we say stands Mr. Hill at the present moment. He has only to read the communication in the present number, from one of the first operators in this city, and one who has always been his friend, to judge of the correctness of our views. This communication is published with the sanction not only of very many New York operators, but of two of those whose certificates he lately published in the N. Y. Times and in his pamphlet, and which we copied into our Journal. Other communications of similar character from other daguerreans may find a place in our columns.

We should like to ask if there ever was a more absurd or tyrannical demand made upon the credulity or fears of man than that exhibited in the following extract, clipped from Mr. Hill's last circular. After requesting the daguerrean artists to buy his chemicals, and a new edition of his book at \$2 per copy, he winds up thus:—

“Those who have the old edition, can easily dispose of one or more copies of the new to pupils or otherwise.

☞ I ask you to do me the favor to send your orders *immediately*, that I may know how many to print. The work will be ready for mailing, *on or before the first of January next*.

“—Here are my proposals. I promise nothing; unless it is to adhere to my original pledge not to suffer monopoly, and to place the name of each patron upon a Book, *as a first applicant** for a right, subject of course, to any future detailed plan. Your patronage shall give you no claim upon my invention, and you shall trust to my honor to fulfil the above intimation in a reasonable and liberal way. If I am out soon, you shall be fair in your concessions to any reasonable plan; if I am delayed you shall not grumble; and if I die, you shall not trouble my ashes.

☞ The attention of *Stock Dealers* is respectfully solicited to the above proposals. A deduction of 10 per cent, from the above rates, is all I can afford.

☞ All communications should be addressed to me—WESTKILL, GREENE Co., N. Y.

Respectfully and fraternally yours,
L. L. HILL.”

Very respectful indeed!

— We understand from reliable authority that some individual by the name of Harrison has lent his name to be placed upon cameras to be manufactured by a new firm in this city, whose sense of moral obligation must be considerably clouded by the hope of gain. This can only be done for the purpose of deceiving daguerreotypists into the belief that they are made by

* What has become of his *first* book of this kind, and of the men whose names are therein recorded?

C. C. Harrison, the celebrated manufacturer, of the same city, and we caution our friends to be on their guard in their purchases of this necessary article. They must remember that the genuine Harrison cameras have his full initials "C. C. Harrison" engraved upon them, with a number, which will enable them to detect fraud very readily.

—As several additions have been made to the list of competitors for the ANTHONY PRIZE PITCHER and GOBLETs we again publish it.

J. Gurney, New York city,
A. Hesler, of Galena, Ill.,
W. A. Perry, of Mobile, Ala.,
Whitney & Denny, of Rochester, N. Y.
P. M. Cary, of Savannah, Geo.
V. L. Richardson, of Nashville, Tenn.
J. A. Whipple, of Boston, Mass.
Harrison & Hill, of Brooklyn, L. I.
Meade & Brother, of New York city,
J. H. Fitz Gibben, of St. Louis, Mo.
D. D. T. Davie, of Utica, N. Y.
G. N. Barnard, of Oswego,
A. Morand, of New York city,
R. B. Appleby, of Rochester, N. Y.
E. A. Stansbury, of Brooklyn, L. I.
S. Rea, of Indianapolis, Ind.
M. B. Brady, of New York city,
M. A. Root, of Philadelphia,
M'Clees & German, of Philadelphia.

— Our next issue will commence a new year—the third of the existence of the Photographic Art-Journal—the only one of three started at the same time that exists as it began. We feel grateful to our friends for this mark of their appreciation, and trust that they will be as prompt in forwarding the means for the successful termination of our next year as they have been in the past. We would respectfully ask our subscribers to send in the amount of their subscriptions at the earliest day possible, and may a happy new year be yours and prosperity crown all your efforts.

PREMIUM FOR THE BEST DAGUERREOTYPE.—One year since I offered a reward

of five hundred dollars for the greatest improvement that should be made in the Photographic art during the year 1851. No applications of any importance were made for it, probably in consequence of the natural modesty of inventors. Inasmuch, however, as the money has been offered, I consider that it no longer belongs to myself but to the Art. Therefore, with the advice and consent of Professor Renwick, Morse and Draper, who were appointed the judges in the matter. I have decided to invest the above amount in a MASSIVE SILVER PITCHER, of appropriate design, to be awarded as a prize for the BEST FOUR DAGUERREOTYPES that shall be offered for competition previous to November 1st, 1853.

No competitor will be allowed to exhibit more than one Daguerreotype of each size.

The Daguerreotypes offered for competition must be on what is called the full, two-third, half and quarter sizes.

After the decision of the judges the pictures will again become the property of the artists who made them, and be returned as may be directed.

A description of the method of operating in the production of the picture offered, must accompany each picture, mentioning the brand of plate and the makers of the various chemicals used, as far as the operator may be able to tell.

In order that there may be no complaint as to partiality, the pictures must be sent anonymously, accompanied by a sealed package containing the name of the artist and the method of operating. The pictures and sealed envelopes will be marked with corresponding numbers in the order of their reception, and the latter will only be opened after the decision of the judges.

As this prize is offered as a test of the skill of manipulators and not the excellence of the camera, no instrument larger than the regular full size must be used. Daguerreotypes taken by the mammoth camera will be excluded.

All who intend to compete for the prize should send in their names as early as possible, as lists of the competitors will from time to time be published.

The pictures must be forwarded to my address, free of expense.

E. ANTHONY.



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